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MODEL 42-10
TRANSMISSION TEST SET

SERVICE MANUAL

HLI®
HEKIMIAN LABORATORIES, INC.

SERVICE MANUAL
MODEL 42-10
TRANSMISSION TEST SET

Manufactured by

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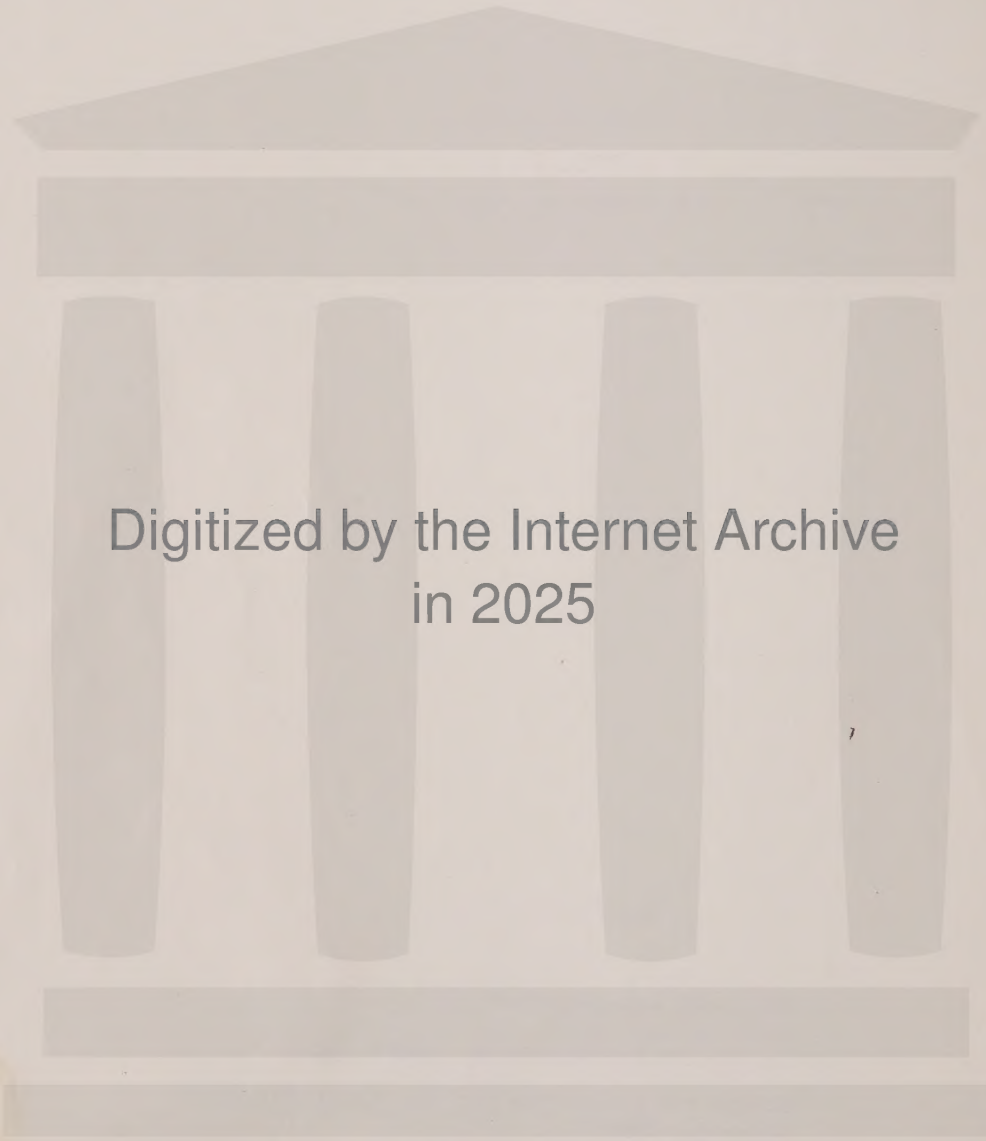
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1. INTRODUCTION

1.1 General Description

The Model 42-10 TRANSMISSION TEST SET combines the functions of level, noise, and frequency measurements with a flexible signal generator in a compact, portable instrument designed to fill a variety of requirements. It features a high level of reliability, accuracy, and operating convenience.

Dual digital displays simultaneously present fully autoranged level or noise measurements and frequency readings from 40 Hz to 20 kHz. Indicating push-button switches are arranged for ease of operation, and all variable controls have excellent resolution and setability. Independent selection of receive and send impedances and an audio monitor add to the unit's flexibility.

Level measurements are made directly in dBm using an average type detector in compliance with Bell System Standards. Noise measurements are made directly in dBrn using a quasi-RMS detector. Program, C-Message, 3 kHz flat, and 15 kHz flat weighting filters are front panel selected and meet the revised (1975) Bell System Standards.

A second display provides a fast update, fully autoranging 4-digit frequency readout in kHz with a 1 Hz or 10 Hz resolution.

The flexible signal generator features both continuous and 100.4 Hz step frequency coverage. For noise measurement, both a 1004 Hz holding tone and a quiet termination are provided. In addition, the unit features two fixed frequencies and one fixed level.

The Model 42-10 is a rugged, compact instrument powered by a self-contained power supply which draws 15 watts from the commercial ac power line. The test set is optionally available with an internal rechargeable battery supply. The power cord and fuse are located inside the rear panel storage compartment.

1.2 Specifications

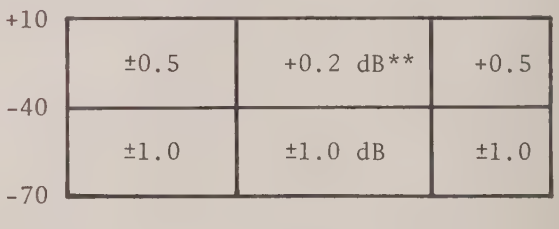
The electrical and mechanical specifications for the Model 42-10 are listed in Table 1-1.

A front view and a rear view of the Model 42-10 are shown in Figure 1-1.

TABLE 1-1

SPECIFICATIONS

GENERAL		
	Measurements	Level (dBm), noise (dBrn), noise-to-ground (dBrn), frequency (kHz)
	Displays	Dual display, level or noise, and frequency
	Generator	Sine wave, fixed and variable frequency, fixed and variable level
	Dial/Talk	Full 2-wire/4-wire capability with dual electronic hold circuits
	Line Select	Receive/send transfer switch
	Audio Monitor	Front panel volume control
INPUT		
	Impedance	600 Ω, 900 Ω, bridged (balanced)
	Return Loss	>30 dB, 200 Hz to 20 kHz
	Balance	>60 dB up to 4 kHz
	Line Hold	Dual electronic hold, nominal 26 mA
LEVEL MEASUREMENT		
	Frequency Range	40 Hz to 20 kHz
	Measurement Range	-80.0 dBm to +10.0 dBm, full autoranging
	Accuracy	dBm



**±0.1 dB at 1000 Hz for levels between 0 and -19 dBm

	Detector Type	Average
NOISE MEASUREMENT		
	Modes	Noise (message circuit) Noise-to-ground
	Weighting Filters	C-Message 3 kHz flat Program 15 kHz flat 1010 Hz notch on all filters* *See Option List

TABLE 1-1 (Cont)

NOISE MEASUREMENT (Cont)	
Measurement Range	+10 to +100 dBrn (noise) +40 to +130 dBrn (noise-to-ground) Full autoranging
Accuracy	±1.0 dB (noise), +20 to +100 dBrn ±1.5 dB (noise-to-ground), +50 to +130 dBrn
Detector Type	Quasi-RMS
FREQUENCY MEASUREMENT	
Frequency Range	40 Hz to 20 kHz, full autoranging
Level Range	-40 dBm to +10 dBm
Resolution/Update	0.040 to 9.999 kHz/7 times per second 10.00 to 20.00 kHz/7 times per second
Accuracy	±1 count
GENERATOR	
Frequency Range	40 Hz to 20 kHz
Modes	Continuous 100.4 Hz stepped* 402 Hz, fixed* 1004 Hz, fixed 2811 Hz, fixed* OFF (quiet termination)
Level Range	-40 dBm to +10 dBm, continuously adjustable* -13 dBm, fixed* (set at 1004 Hz)
Distortion	>60 dB, 1004 Hz fixed >50 dB, 200 Hz to 4000 Hz >40 dB, 40 Hz to 20 kHz
Impedance	600 Ω, 900 Ω (balanced)
Return Loss	>30 dB, 200 Hz to 20 kHz
CONNECTORS	
Receive/Send	310 type jacks/5-way binding posts
4W Talk	310 type jacks
2W Dial/Talk	Cuff Links
POWER	105-130, 210-260 V ac, 47-63 Hz, 15 watts
SIZE	9-1/2" (24.1 cm.) W x 5" (14.0 cm.) H x 15" (38.1 cm.) D with cover
WEIGHT	20 lbs. (9.1 kg.) with battery

*See Option List

TABLE 1-1 (Cont)

OPTIONS	-2.	Rechargeable battery pack/ac supply
	-4.	Alternate fixed frequencies in place of 402 and 2811 Hz. Must be below 4.0 kHz and multiples of 100.4 Hz (100.0 Hz with option -14).
	-6.	Alternate fixed generator level in place of -13 dBm output
	-13.	Rack mounting panel and hardware - specify rack width, vertical height increment, and mounting details
	-14.	100.0 Hz step in place of 100.4 Hz
	-16.	Switched notch filter
	-17.	Dual range output level control

HLI reserves the right to make changes in specifications at any time without notice.

FRONT VIEW

REAR VIEW

FIGURE 1-1. MODEL 42-10 TRANSMISSION TEST SET

2. INSTALLATION

2.1 General

The Model 42-10 TRANSMISSION TEST SET is designed for ease of operation and installation. After the unit has been removed from its shipping container, perform a complete visual inspection for possible damage. If damage is found, notify the carrier immediately; do not destroy any packing material until an agent of the carrier has examined it. Under U.S. shipping regulations, damage claims must be submitted by the consignee; do not return the instrument to Hekimian Laboratories, Inc., until a claim for damages has been established.

All internal adjustments have been set at the factory and no further adjustments are required prior to installation or use of the equipment.

2.2 Installation

Power for the unit is supplied either from the ac power line via the line cord or from internal rechargeable batteries. The batteries will be charged as long as the unit is connected to the ac power line. Access to the ac line cord and main fuse is made by removal of the storage compartment cover on the rear of the unit as shown in Figure 1-1. This compartment is provided for storage of the line cord and other small adapters or test cables that may be used with the test set. The storage compartment cover may be attached to the unit with the ac line cord either in or out.

Signal receive/send lines are connected to the front panel WECO 310 jacks or 5-way binding posts. Shielded cable is recommended for all signal connections.

2.3 Subassembly Replacement

This section contains the removal instructions for the Model 42-10 printed circuit boards as shown in Figure 2-1 and batteries (optional) as shown in Figure 2-2.

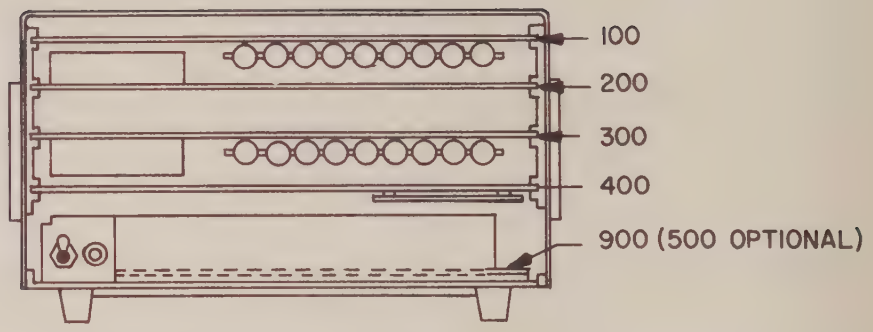


FIGURE 2-1. LOCATION OF PRINTED CIRCUIT BOARDS

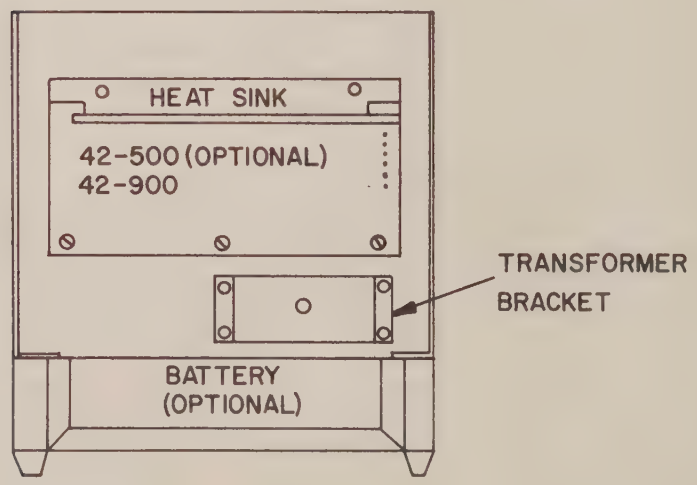


FIGURE 2-2. SUBASSEMBLY REPLACEMENT

2.3.1 Main Printed Circuit Boards

There are two pairs of printed circuit boards. The upper pair contains the receive circuitry and digital voltmeter (100/200 bd.). The lower pair contains the clock circuitry, frequency counter, and generator (300/400 bd.). Refer to Figure 2-1.

Note: To maintain proper calibration, these boards must always be replaced in pairs (100/200 bd. or 300/400 bd.).

To remove the printed circuit board pairs, remove the two front panel attachment screws on each side of the test set as shown in Figure 2-3. Lift the front panel straight out and then to the right. The board pairs may then be removed by gripping the switch brackets and gently pulling forward.

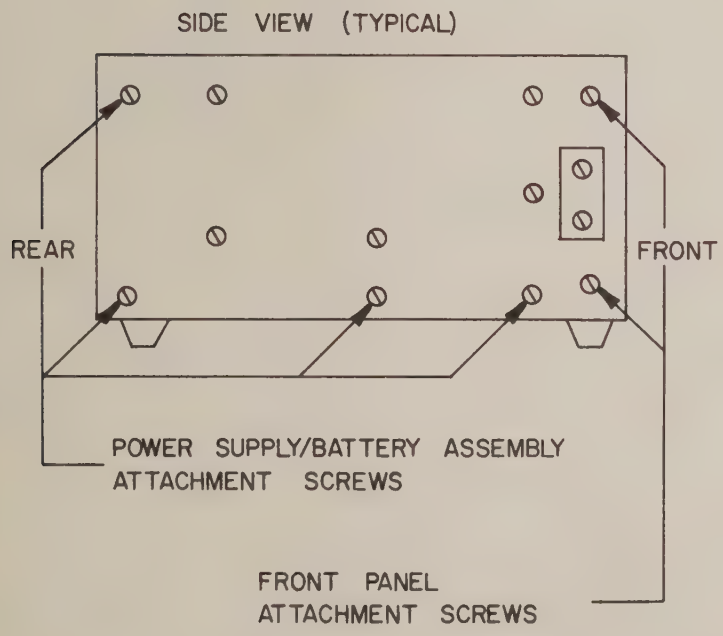


FIGURE 2-3. ASSEMBLY/DISASSEMBLY SCREW LOCATIONS

To replace the board pairs, line the switch board up with the highest or lowest card guide and gently push the board pair into the unit until fully seated in the rear panel connector. Line up the front panel and position it over the switch pushbuttons. Replace the four mounting screws.

2.3.2 Power Supply Assembly

The power supply and batteries (optional), as shown in Figure 2-2, make up a separate subassembly mounted on the bottom plate of the test set. To remove the power supply assembly, remove the power supply mounting screws shown in Figure 2-3 from each side of the unit.

Separate the power supply assembly and mainframe by gently lifting the mainframe up and to the front of the power supply assembly. Remove the flat cable connector which feeds the mainframe from the power supply. The power supply assembly can then be repaired or replaced.

To reassemble the unit, connect the flat cable connector to the power supply and reassemble the mainframe and power supply assemblies.

2.3.3 Batteries (Optional)

As an option, the unit is powered by two 12 volt rechargeable batteries. These batteries have been selected for minimum maintenance and long life.

If it becomes necessary to replace the batteries or the fuses for the battery charging circuitry, remove the power supply assembly as described in Section 2.3.2. Once the power supply assembly is separated from the mainframe, remove the two screws on each side of the battery tray. Remove the batteries by lifting them up and out of the battery holder. Care should be taken to ensure that the battery leads are not reversed. The violet wire goes to the negative terminal of one battery while the red wire goes to the positive terminal of the other battery. The white/black wires go to the one remaining terminal of each battery on each side of the unit. The fuses for the battery charging circuitry are located on the power supply board and can be easily replaced once the power supply assembly has been separated from the mainframe.

3. OPERATION

3.1 General

This section contains a description of the controls and indicators, operating procedures, and methods of measurement to be used for the Model 42-10. Prior to operation, be sure that all connections to the instrument are made in accordance with the instructions in Section 2.0.

The Model 42-10 block diagram is shown in Figure 5-1. The generator section (400 bd.) consists of a 1004 Hz test tone sine wave generator and a continuously variable oscillator which may be frequency locked in 100.4 Hz (100.0 Hz optional) step intervals. For fixed frequencies other than 1004 Hz, the unit is internally connected in the 100.4 Hz step mode. The desired mode of operation is fed to the send amplifier (400 bd.) whose amplitude is controlled by the front panel generator LEVEL control.

The receiver can be selected to measure either level or noise. In the noise mode, a 1010 Hz notch filter (100 bd.) is inserted before the noise weighting filters (100 bd.). When a desired mode has been selected, the signal is then fed to the autorange amplifier (100 bd.), detectors (200 bd.), and digital voltmeter (200 bd.). Connections are also made to the frequency counter (300 bd.) and audio monitor amplifier (400 bd.).

The master clock is a 2 MHz oscillator (300 bd) from which all other timing pulses are derived. This oscillator is also used to derive the fixed 1004 Hz test tone.

The unit is powered from either the ac power line or optional rechargeable batteries. The power supply assembly contains the battery chargers, regulated ±9 V dc power supplies and a regulated +5 V dc power supply used to power the displays.

3.2 Controls and Indicators

The controls and indicators used in the operation of the Model 42-10 are described in Table 3-1. All controls and indicators are located on the front panel and are shown in Figure 1-1. Internal adjustments are not required.

TABLE 3-1

CONTROLS AND INDICATORS

Designation	Function
RECEIVE Pushbutton Switches	Selects either 600 Ω or 900 Ω impedance, terminated or bridged modes.
DBRN Pushbutton Switches	Selects and places the 3 kHz, 15 kHz, C-Message, or program weighting filter in series with the notch filter. When one of the noise weighting filters is selected, a quasi-RMS detector is used and the LEVEL displays dBrn directly. When noise measurements are being made, the frequency KHZ counter display is blanked.
DBM Pushbutton Switches	Selects either send or receive level. The average detector is used for level measurement and the level meter displays level directly in dBm. In this mode, the counter displays the frequency of the measured signal.
GENERATOR KHZ Pushbutton Switches	Selects the desired generator mode.
FREQUENCY Control	Sets the desired frequency in continuous or 100.4 Hz stepped mode of operation.
LEVEL Pushbutton Switches	Selects either the fixed level (-13 dBm), variable level, or the quiet termination (OFF),
LEVEL Control	Sets the desired send level in the variable mode.
SEND Pushbutton Switches	Selects either 600 Ω or 900 Ω impedance and sets the dBm reference impedance for the generator.
MONITOR Control	Controls the monitor speaker level.
NOISE TO GND/NORMAL Switch	Selects the noise-to-ground measurement mode when one of the noise weighting filters is selected. The level meter display reads directly in dBrn without corrections or dB additions.
NORM/REV Switch	Selects which of the jacks is internally connected for the send/receive measurements. Transfers the send/receive function for 2-wire operation.
2-Wire HOLD/OFF Switch	Places an electronic hold circuit across the send and receive lines when not in the 2-wire dial mode of operation.

TABLE 3-1 (Cont)

Designation	Function
DIAL-TALK/MEAS Switch	Internally connects either the 4-wire talk circuitry to the send and receive inputs or connects the 2-wire dial connectors to the receive TIP and RING jacks (NORM) or to the send TIP and RING jacks (REV), depending upon the position of the 2W/4W switch.
AC/OFF/(BATT) Switch	Controls the ac primary power or battery power (optional) to the instrument.
Battery Indicator LED (optional)	Provides visual indication of state of charge of internal batteries. For proper indication, the ac power cord should be disconnected and the POWER switch set to BATT position.
2W/4W Switch	Selects either the 2-wire or 4-wire mode of operation for complete dial/talk capability.
HIGH/FLOAT Charge Switch (optional)	Controls the battery charge voltage. The switch is normally left in the FLOAT position.

3.3 Operating Adjustments

This section presents the operating adjustments used with the Model 42-10 TRANSMISSION TEST SET. Connections to the send and receive jacks are made in accordance with the instructions given in Section 2.

3.3.1 Receive Measurements

This section contains the operating instructions used for the receive level meter.

3.3.1.1 Receive Input Impedance

Select the receiver reference impedance by pressing either the RECEIVE 600 Ω or RECEIVE 900 Ω pushbutton. Select either the terminated or bridged mode by pressing either the RECEIVE TERM or RECEIVE BRIDGE pushbutton.

3.3.1.2 Level Measurement

When the receive input impedance has been properly selected, press the DBM REC pushbutton switch. This selects the average detector and indicates level directly in dBm referenced to the selected receive impedance.

The range of level measurement is -80 to +10 dBm. When the input is above or below this range the display numbers will blank, leaving an illuminated + sign when the input is above +10 dBm or a - sign when the input is below -80 dBm.

3.3.1.3 Noise Measurements

Message circuit noise is measured by pressing the DBRN C-MSG, DBRN 3 KHZ, DBRN 15 KHZ or DBRN PROG filter pushbutton. A 1010 Hz notch filter is automatically inserted before the selected noise weighting filter. All noise measurements are read out directly in dBrn.

The range of noise measurements is +10 to +100 dBrn. When the input is above or below this range, the display numbers will blank, leaving an illuminated + sign when the input is above +100 dBrn, or a - sign when the input is below +10 dBrn.

3.3.1.4 Noise-to-Ground Measurements

Noise-to-ground measurements are made by setting the NOISE TO GND/NORMAL switch to NOISE TO GND. Either DBRN C-MSG, DBRN 3 KHZ, DBRN 15 KHZ, or DBRN PROG must be selected. The level meter display reads directly in dBrn without corrections or dB additions.

The ground connection to the test set is made to either the front panel ground post or the sleeve(s) connections of either the SEND or REC front panel 310 jacks.

The range of noise measurements is +40 to +130 dBrn. When the input is above or below this range, the display numbers will blank, leaving an illuminated + sign when the input is above +130 dBrn, or a - sign when the input is below +40 dBrn.

3.3.2 Frequency Measurement

The input to the frequency counter is controlled by the DBM pushbuttons. The input to the counter is selected by pressing either the DBM SEND or DBM REC pushbutton. When a noise measurement is being made, the counter display is automatically blanked.

If the frequency display is all 0's when the DBM REC pushbutton is pressed, the receive level is below approximately -45 dBm.

3.3.3 Audio Monitor

The input to the audio monitor is controlled by the DBM and DBRN pushbuttons. The level to the audio monitor is controlled by the front panel MONITOR control.

3.3.4 Generator

This section contains the operating instructions used for the Model 42-10 generator. To measure the generator frequency and level, press the DBM SEND pushbutton. Select the desired send impedance by pressing either the SEND 600 Ω or SEND 900 Ω pushbutton.

3.3.4.1 Continuous Mode

Press the GENERATOR-KHZ CONT pushbutton. Use the FREQUENCY and LEVEL controls to adjust for the desired send level and frequency as indicated on the displays.

3.3.4.2 100.4 Hz Step Mode

Press the GENERATOR-KHZ STEP pushbutton. Use the FREQUENCY control to adjust the send frequency in 100.4 Hz steps, and adjust the LEVEL control for the desired send level as indicated on the displays.

3.3.4.3 Fixed Frequency MOde

Press the desired frequency pushbutton. This automatically selects the 100.4 Hz step mode at the proper frequency.

Press the GENERATOR-KHZ 1.004 pushbutton in order to send the 1004 Hz test tone. The send level is adjusted using the LEVEL control.

3.3.4.4 Send Level Measurement

The send level is selected by pressing the desired LEVEL pushbutton. When the OFF pushbutton is in, a quiet termination is applied to the send terminals. In the VAR mode, the send level is adjusted using the front panel LEVEL control. The third LEVEL pushbutton applies a fixed level (standard unit -13 dBm) to the send terminals.

In accordance with telephone company transmission level practices, the send level measurement is calibrated in terms of the level that will exist at the send terminals when they are properly terminated in the impedance selected by the SEND pushbutton switches. If the actual terminating impedance is different

from the selected impedance (600 Ω or 900 Ω), send levels other than that indicated will exist at the send terminals. The actual level across the send terminals may be verified using an external meter or temporarily bridging the Model 42-10 receive terminals (in the bridge mode) across the send terminals. The receive impedance must be the same as the send impedance.

3.3.5 Dial/Talk Operation

This section contains the operating instructions used for either 2-wire or 4-wire dial/talk mode of operation.

3.3.5.1 2-Wire Dial/Talk

Set the 2W/4W switch to 2W. Connect the lineman's handset to the 2W DIAL/TALK connectors. Set the DIAL-TALK/MEAS switch to DIAL-TALK. This connects the lineman's handset across the line. Using the lineman's handset, dial-up the desired line. When the desired connection has been made, set the HOLD/OFF switch to HOLD and the DIAL-TALK/MEAS switch to MEAS. Measurements can then be made on the dialed-up line. Communications of a dialed-up line can be made by placing the DIAL-TALK/MEAS switch to DIAL-TALK. The lineman's handset may be left connected without adversely affecting the performance of the Model 42-10.

When the NORM/REV switch is in NORM, the 2W dial connectors are connected across the NORM/REC line. When the NORM/REV switch is in REV, the 2W dial connectors are connected across the NORM/SEND line.

To dial out on both lines, set the DIAL-TALK/MEAS switch to DIAL-TALK and dial-up the desired line. Once the desired connection has been made, set the HOLD/OFF switch to HOLD and set the NORM/REV switch to its opposite position. You can now dial-up on the second line. If a dial tone is not present, go on-hook on the lineman's handset and then back to off-hook to obtain a dial tone. Once both connections have been made, set the DIAL-TALK/MEAS switch to MEAS.

3.3.5.2 4-Wire Dial/Talk

The Model 42-10 supplies an internal talk battery in the 4-wire dial/talk mode. The unit will interface with both wet and dry 4-wire facilities and will provide full talk/listen operation without external batteries.

Connect the headset to the 4-wire connectors. Set the 2W/4W switch to 4W. Set the DIAL-TALK/MEAS switch to DIAL-TALK. This internally connects

the headset receiver to the output of the receive amplifier and connects the headset microphone to the input of the send amplifier. The talk and listen functions on the incoming lines can be interchanged by reversing the NORM/REV switch.

Normal measurements can be made by setting the DIAL-TALK/MEAS switch to MEAS. Communications over the lines can be made by placing the DIAL-TALK/MEAS switch to DIAL-TALK. The headset may be left connected without affecting the performance of the Model 42-10.

3.3.6 Battery Check (Optional)

When supplied with the optional rechargeable battery pack, the Model 42-10 will always be recharged when the line cord is plugged into an active power outlet. The front panel POWER switch does not control the charging function.

The battery pack provides automatic shutdown and a battery charge indicator LED. This LED will give a visual indication of the state of charge when the AC/BATT switch is in the BATT position. For proper indication, the ac line cord must be disconnected. (With the ac line cord connected, the battery indicator monitors the output of the battery charger.)

The LED will be on when the Model 42-10 is operating from the battery pack and the battery voltage is above the cutoff threshold.

WARNING: When the instrument is in the auto shutdown mode, the load is disconnected from the battery. When this occurs, the battery will recover slightly and may cause the battery indicator LED to come on. If the LED flashes or is off, the POWER switch should be placed in the AC or OFF position and the unit connected to an active ac power outlet. This will recharge the battery pack and increase the useful life of the batteries. Under no conditions should the batteries be left in the discharged state for an extended period of time.

The HIGH/FLOAT charge switch (located on the bottom of the chassis) controls the magnitude of the voltage used to charge the batteries. The switch is normally left in the FLOAT position which keeps the batteries charged when the unit is connected to the ac power line.

In the FLOAT position, the battery pack is on charge at a constant potential slightly greater than the normal open circuit voltage of the battery. In this position the Model 42-10 may be left connected to the ac line continuously without harming the battery pack.

In the HIGH position, the battery pack is on charge at an increased potential so that the battery pack may be recharged more rapidly after a deep discharge. This position should only be used when the Model 42-10 has been in the automatic shut down mode or when the battery pack capacity appears to be decreasing.

WARNING: In the HIGH voltage mode, the battery pack is recharged in 12 to 20 hours depending upon how deep the discharge was and how long the battery has been left discharged. After this time the HIGH/FLOAT charge switch must be placed in the FLOAT position.

The Model 42-10 should not be left connected to the ac line for more than 30 hours with the switch in the HIGH position. If the batteries remain under a high voltage charge for an extended time, they will undergo overcharging, lose electrolyte and age prematurely.

4. THEORY OF OPERATION

4.1 General

This section provides a general theory of operation followed by detailed circuit operation on a functional block basis. The Model 42-10 is entirely solid state and makes extensive use of integrated circuit operation amplifiers and CMOS digital logical circuits. Discussions of conventional transistor circuitry, operational amplifier theory and digital logic circuitry are available in a number of current reference texts. The Model 42-10 block diagram shown in Figure 5-1 is discussed in the following sections.

4.1.1 Level/Noise Meter

The receive circuitry bridges or terminates 600 Ω and 900 Ω receive lines. The receive signal is then transformer coupled to the receive amplifier which drives the autoranging circuitry for level measuements and drives the notch and noise weighting filters for noise measurement. The autorange circuitry, which may monitor either the receive or send signals, automatically adjusts the amplifier gain to keep the received signal level within the range of the detector. The dc output of the detector is applied to the log converter. The log converter changes the linear voltage output of the detector to a logarithmic output to allow a display of the level and noise directly in dB. The digital voltmeter takes the output of the log converter and control signals from the autorange amplifier and converts these to the 3-digit display of noise or level.

A front panel controlled monitor speaker is also provided which allows the operator to audibly monitor the receive signal.

4.1.2 Frequency Counter

A 4-digit frequency counter with autoranging display monitors the signal applied to the level/noise meter. The counter uses a large scale integration (LSI) CMOS IC to perform the frequency counting operation and drive the 4-digit multiplexed display.

4.1.3 Generator and Clock

The tuneable frequency generator uses a voltage controlled oscillator (VCO) operating at 40 times the output frequency to drive a low distortion

stairstep sine wave generator. The generator output is processed by four programmed filters to provide excellent spectral purity. Continuous frequency control or 100.4 (100.0 Hz) steps using frequency step circuitry in the VCO may be front panel selected. In the fixed frequency mode of operation, the Model 42-10 internally selects the 100.4 step mode with a preset VCO control voltage. A separate circuit, consisting of a fixed frequency divider and 2-pole 1004 Hz bandpass filter, generates a high stability, high purity 1004 Hz holding tone.

The selected generator signal is applied to the send amplifier where the output level is controlled and then to the output driver which transformer couples the selected generator signal at either a 600 Ω or 900 Ω impedance level to the send terminals.

A 2 MHz master clock oscillator is used to generate the various clock, control, updating and locking frequencies required in the operation of the level/noise meter, frequency counter and generator sections. The master clock is crystal controlled.

4.1.4 Power Supply

The power supply provides the ±9 V dc and +5 V dc used in the Model 42-10. The supply is designed to operate directly from the ac line using a transformer and bridge rectifier to supply in internal ±21 V dc. All voltages are electronically regulated for accuracy and long term stability, compensating for temperature and line voltage fluctuation.

4.2 Detailed Circuit Operation

The following sections describe the detailed circuit operations for the level/noise meter, frequency counter, generator and clock, and power supply. Schematics and timing diagrams are presented in Section 5.0.

4.2.1 Level/Noise Meter

4.2.1.1 Receive Circuit (42-101 Board) [Refer to Figure 5-3]

The receive signal is connected to the front panel RECEIVE jack (Figure 5-1). It is then routed to the 42-101 board (Figure 5-3) which contains the dc isolation capacitors, the RECEIVE TERM switch S3, and the RECEIVE 600 Ω/900 Ω terminating resistors and selection switches. The signal is then trans-

former coupled to input amplifier IC1. This wideband low noise op-amp drives the level and noise filter circuitry and provides the received signal for 4-wire dial/talk.

4.2.1.2 Noise Filters (42-101 Board)

Input amplifier IC1 drives 4-pole notch filter IC16, IC15, IC14, IC13, and IC12. This filter makes use of coupled active notch filters with excellent overall stability. The notch design has a passband loss of approximately 6 dB and each pole is provided with individual frequency and depth adjustments.

The 3 kHz flat filter (IC8A), 15 kHz flat filter (IC8B, IC9), program filter (IC6 and IC7), and C-Message filter (IC9, IC10, and IC11) use conventional active filter techniques to generate the noise weighting characteristics.

4.2.1.3 Level Measurement (42-101 Board)

Switches S5 and S9 select either the noise signal or level signal for routing to the FET gates Q3 and Q4.

The send signal is connected to FET gates Q1 and Q2. These gates provide both a transmission gate and a short-to-ground to minimize signal cross-talk. The 600 Ω and 900 Ω gain adjustment is controlled by switches S1, S2, S3 and resistors R72 and R76.

4.2.1.4 Autorange Amplifier (42-101 Board)

The autorange amplifier accepts the noise, receive level or send level signal and adjusts its gain in 20 dB steps to keep the signal level within the detector operation range.

The autorange amplifier consists of three cascaded 20 dB gain amplifier stages with individual FET gates to select the desired amplifier output.

The three amplifiers (IC2, IC3, and IC4) are identical and include a 20 dB gain amplifier state with dc blocking, level detector diodes, a detector amplifier and a transistor logic gate which, in conjunction with the other amplifiers, opens the proper FET gate Q10, Q11, Q12, or Q13 to connect the output to the signal detector circuitry. Logic diodes D17, D18, D19 and D20 and driver transistors Q5, Q6 generate the range control signals for the digital display so that it matches the selected range of the autorange amplifier.

The low pass filter IC18 reduces the noise bandwidth of the signal to the detectors.

4.2.1.5 Detectors (42-201 Board) [Refer to Figure 5-5]

The autorange amplifier output is connected through the flat cable to the 42-201 board and applies a signal to the quasi-RMS detector used for noise and the average detector used for level detection. The detectors use a common full-wave rectifier circuit, IC26, which provides outputs for the quasi-RMS detector, IC27 and IC28A and the average detector IC28B. Both detectors incorporate dc bias adjustments.

The detector output is selected by electronic switch IC29 which is controlled by the noise and level switches. The detector output is buffered by IC30 and connected to the log converter.

4.2.1.6 Log Converter (42-201 Board)

The log converter takes the detected signal output and converts it to a gated clock signal whose duration is proportional to the logarithm of the input.

Capacitor C10 is charged to the detector output level through IC31. Every 320 ms, the capacitor is disconnected from the detector and allowed to discharge to the reference voltage set by D1 and R26 through R29. The discharge period is converted to a pulse by IC32 and IC21. This pulse is synchronized with the 100 kHz clock by flip-flop IC22 to prevent partial clock pulses.

4.2.1.7 Digital Voltmeter (42-201 Board)

The gated clock output from the log converter, the range information from the autoranging amplifier, the update clock and the unit (dBm, dBrn) control signals are processed by the digital voltmeter to provide a 3-digit plus sign level and noise readout directly in dBm/dBrn.

The number to be displayed is accumulated in the four preset decade counters IC9, IC10, IC11, and IC12. Thses counters take the gated clock pulses from the log converter and accumulate the hundredths, tenths, units and tens digits. The preset circuitry takes the range of information from the autoranging amplifier and presets the counters to the correct 20 dB range. The outputs of the preset counters are fed to the display latches, IC15, IC6, and IC7 which drive the 7-segment displays.

Overrange blanking is controlled by the overrange detectors, IC24A, IC24B, which process the range and level information from the autoranging amplifier and the detector output to determine overrange/underrange conditions. The remaining digital logic provides half-digit and polarity displays, control of the decimal point, and blanking of the tenths digit during noise measurements.

4.2.1.8 Monitor (42-201 Board)

The level or noise signal selected for display may also be monitored with the internal monitor amplifier and speaker.

The monitor signal is obtained from the output of the input amplifier of the autorange amplifier. It is routed to the 42-401 board and the front panel monitor gain control. This control is connected to monitor amplifier IC22 and monitor driver transistor Q1, Q2. These transistors provide a low impedance drive directly to the monitor speaker.

4.2.2 Frequency Counter (42-301 Board) [Refer to Figure 5-7]

The frequency counter provides a 4-digit autoranging display. It makes use of a large scale integrated (LSI) counter IC with multiplexed display and the necessary external circuitry to provide analog signal processing, gating, reset/updating and leading zero suppression.

The counter analog input is derived from the third stage of the autoranging amplifier and is converted to logic levels by IC8 and IC9.

The input frequency is increased by a factor of 10 by IC6 and IC7 if the frequency is below 10 kHz. This allows rapid updates of the counter display rather than the one per second which is commonly provided for 1 Hz resolution.

When the input frequency is greater than 10 kHz, the output of the frequency multiplier is disabled and the output of IC8 is connected to the count circuitry.

A 100 Hz clock signal is processed by counter IC6 and flip-flop IC15A to provide the count gate. Reset and update pulses are generated by gates IC16 and IC17 with their corresponding RC time constants. Leading zero suppression is provided by flip-flop IC21 and logic gates IC16, IC19.

The counter display is turned off when any of the noise weighting filters are selected.

4.2.3 Generator and Clock

4.2.3.1 Clock (42-301 Board)

The clock circuitry uses a 2 MHz crystal oscillator, Y1, IC5, and a divider chain, IC10, IC11, IC12 to provide the 500 kHz clock to the fixed frequency divider circuitry; the 100 kHz clock to the log converter; the 100 Hz clock to the frequency counter, generator lock circuitry, log converter and digital voltmeter.

4.2.3.2 1004 Hz Generator

The 1004 Hz generator provides the high accuracy, low-distortion holding tone for the generator section.

A feedback counter arrangement on the 42-301 board uses gates IC2, IC1 to divide the 500 kHz clock signal by 249. A final ÷2 stage, IC4, provides a symetrical square wave to the 2-pole bandpass filter IC1 on the 42-401 board. The filter provides better than 60 dB harmonic rejection, providing a high purity sine wave at 1004.016 Hz. The filter output is fed to the GENERATOR-KHZ 1.004 switch, S2, which is used to select the 1.004 kHz generator output.

4.2.3.3 Tuneable Generator (42-401 Board) [Refer to Figure 5-9]

The tuneable generator uses a frequency locked oscillator, 100.4 Hz step circuitry, a waveform generator and switchable filters to generate the variable frequency generator signal.

The frequency-locked oscillator, IC3, operates at 20 times the generator output frequency and covers the range from 0.7 kHz to 400 kHz. An internal phase detector together with R28 and C9 doubles the oscillator output frequency by providing a pulse for each zero crossing. Its output is changed to a BCD number by counter IC8 which drives the BCD to decade decoder IC9. The decoder outputs drive a precision resistor network which generates, as a result of the up/down counter operation, a 20-step replica of a positive half sine wave. This stairstep replica is buffered by amplifier IC10A and is inverted every half cycle by switched amplifier IC10B. This amplifier is switched from the inverting to the noninverting configuration by two transmission gates under the control of flip-flop IC4.

Switchable filter IC19B filters the stairstep half sine wave to provide a smooth, low-distortion sine wave. Four filter bandwidths are selected by the transmission gates controlled by threshold detectors IC17 and IC18. These threshold circuits monitor the frequency locked oscillator dc control voltage, which is proportional to frequency, to control the range over which each filter bandwidth is used.

The frequency-locked oscillator may be tuned continuously using the front panel FREQUENCY control or stepped in 100.4 Hz steps using the front panel GENERATOR-KHZ/STEP switch. In the stepped mode, the 100.4 Hz clock signal is buffered by amplifier IC14 and samples the sine-wave generator output in transmission gate IC13. In the stepped mode, this signal is summed through

transistor Q3 with a voltage proportional to the frequency locked oscillator frequency derived by the charge pump discriminator IC5, integrated by integrator IC6A, and applied to the oscillator frequency control input.

4.2.3.4 Output Amplifier (42-401 Board)

The 1004 Hz fixed or tuneable generator outputs are selected by S2 and IC15 and applied to either the front panel generator send LEVEL control or the fixed LEVEL control. The signal is then connected to output amplifier IC20 on the 42-201 board. This signal is coupled to final output amplifier IC21 which provides the transformer-coupled balanced output signal to the impedance determining networks and dc isolation capacitors.

The send level measurement signal and adjustment are provided after output amplifier IC20. Switches S9 and S10 select the output impedances and the proper output levels.

4.2.4 Power Supply (42-901 Board) [Refer to Figure 5-16]

The ac line is connected through the fuse and front panel POWER switch to the power transformer T1. The secondaries of the power transformer are connected to the diode bridge, D5, on the 42-901 board. The diode bridge is connected to filter capacitor, C1, C2, and to the plus and minus voltage regulators.

The +9 V regulator consists of transistors Q1 through Q5 and their associated components. The -9 V regulator consists of transistors Q9 through Q10 and their associated components. Transistor Q10 is connected across the regulator outputs to provide a tracking control voltage to the regative regulator.

The +5 V regulator consists of the 3-terminal regulators IC1, IC2, and their associated components.

4.2.5 Power Supply - Battery Option (42-501 Board) [Refer to Figure 5-12]

When supplied with the optional rechargeable battery pack, the Model 42-10 may be operated directly from the battery pack or from the ac line.

The power supply provides the ±9 V and +5 V used in the Model 42-10. All voltages are electronically regulated for accuracy and long term stability, compensating for temperature and line voltage fluctuation.

The ac line is connected through the fuse and front panel POWER switch to the power transformers T1, T2. The secondaries of the power transformers are connected to the diode bridge, D2, on the 42-501 board. The diode bridge is

connected to filter capacitor, C9, C10, and to the plus and minus voltage regulators. The diode bridge output is also connected to the battery chargers IC1, IC2. These battery chargers are both current limited and voltage regulated to prevent overcharging of the battery pack. The battery charger consists of integrated circuit voltage regulators, IC1, IC2 with external pass transistors Q2, Q3.

The +9 V regulator consists of transistors Q4 through Q8 and their associated components. Transistor Q13 is connected across the regulator outputs to provide a tracking control voltage to the negative regulator.

The +5 V display power supply uses a 3.5 kHz switching regulator to minimize efficiency. The 5 V output is compared with the -9 V summing integrator IC3B. The error voltage from IC3B is compared with a reference set by the 2.5 kHz clock in IC3A to control the on-time of pass transistors. Q15 and Q17.

Transistors Q18, Q19 and Q20 provide current limiting for the +5 V supply.

4.2.6 Hold Circuit ((42-601 Board) [Refer to Figure 5-14]

The electronic hold circuit is located on the 42-601 board and provides a constant 26 mA current sink when switched across an active line. Diode bridge, D1, is used to provide a polarity insensitive circuit.

4.2.7 Dial/Talk

The dial/talk circuitry is located on the front panel and consists of switches S4, S5; jacks J3, J4; and the cuff link connectors.

In the 2-wire mode of operation, the receive circuitry is disconnected from the NORM REC jack and the 2-wire dial/talk T, R jacks are connected to the NORM REC jack TIP and RING, respectively. If the NORM/REV switch is in the REV position, the 2-wire dial/talk T, R jacks are connected to the NORM SEND jack.

In the 4-wire mode of operation, the output of the input buffer amplifier is connected to the 4-wire earphone and the output from the 4-wire microphone is connected to the output amplifier. Power for the microphone is provided by R6 and the +9 V supply bus.

5. MAINTENANCE AND CALIBRATION

5.1 Maintenance Philosophy

Maintenance procedures for the Model 42-10 are divided into preventative and corrective classifications. Preventive maintenance consists of a routine performance check which may be made using the front panel controls of the instrument. Corrective maintenance covers the symptom analysis, troubleshooting, repair, and recalibration of the instrument.

5.2 Preventive Maintenance

5.2.1 General

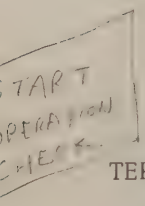
The preventive maintenance procedures described in the following sections are used by the operator and maintenance personnel to verify proper instrument operation using the front panel controls. If proper operation is not achieved, see Section 5.3 for corrective maintenance procedures.

Periodic cleaning, lubrication or inspection of the Model 42-10 is not required.

The following checks are made by looping the Model 42-10 send to the Model 42-10 receive. Connections between the send and receive terminals may be made using an appropriate test cord.

5.2.2 Generator

This section contains the self-checks that may be used for the generator section of the Model 42-10. If proper operation of the Model 42-10 receiver section is in doubt, an external frequency counter and voltmeter may be used to check the generator.



5.2.2.1 1004 Hz Generator

Set the following pushbuttons to the in position: DBM REC, RECEIVE TERM, RECEIVE 600 Ω, GENERATOR-KHZ 1.004, LEVEL VAR and SEND 600 Ω. All other pushbuttons should be in the out position. Connect the send and receive terminals together with an appropriate test cord. Using the send LEVEL control, adjust the output for a reading of ±0.0 dBm. The KHZ display should indicate 1.004 Hz ±1 Hz. Press the 3 KHZ pushbutton and verify that the display indicates less than -50 dBm. (≥ +4ØdBrn)

5.2.2.2 Frequency Range

Set the DBM REC and GENERATOR-KHZ CONT pushbuttons to the in position. Using the front panel FREQUENCY control, vary the frequency over its entire range and verify that the frequency range covers at least 40 Hz to 20 kHz.

5.2.2.3 100.4 Hz Step

Set the GENERATOR-KHZ STEP pushbutton to the in position. Using the front panel FREQUENCY control, vary the frequency over the range 200 Hz to 20 kHz and verify that the frequency changes in 100.4 Hz steps.

Press the fixed frequency pushbuttons and verify that the counter indicates the correct frequency ±1 Hz.

5.2.2.4 Level Range

Set GENERATOR-KHZ 1.004 pushbutton to the in position. Using the front panel LEVEL control, vary the level over its range and verify that the send level includes the range +10.0 dBm to -40.0 dBm.

Press the fixed level pushbutton and verify that the display indicates the correct level ±0.2 dB.

5.2.3 Frequency Counter

Set GENERATOR-KHZ VAR pushbutton to the in position, using the FREQUENCY control, vary the frequency from 40 Hz to 20 kHz and verify that the frequency counter follows the generator output and autoranges from the 1 Hz resolution to 10 Hz resolution at a frequency of 10 kHz.

Press each of the noise-weighting pushbuttons in turn and verify that the frequency display blanks in each case.

5.2.4 Audio Monitor

Set the DBM SEND and GENERATOR-KHZ 1.004 pushbuttons to the in position. Using the front panel LEVEL control, adjust the send level for a reading of 0.0 dBm. Adjust the MONITOR level control and verify the presence of a 1004 Hz tone from the speaker. The speaker output should increase in level as the MONITOR control is turned clockwise.

5.2.5 Receiver

This section contains the various checks for the receive section. Once proper operation of the generator section has been verified, the generator may be used as the input signal to the receiver.

5.2.5.1 Frequency Range

Set the following pushbuttons to the in position: DBM REC, RECEIVE TERM, RECEIVE 600 Ω, GENERATOR-KHZ CONT, LEVEL VAR and SEND 600 Ω. All other pushbuttons should be in the out position. Using the front panel FREQUENCY control, adjust the generator FREQUENCY control for an indicated frequency of 1000 Hz ±10 Hz. Using the front panel LEVEL control, adjust the generator output level to 0.0 dBm ±0.1 dB. Using the FREQUENCY control knob, adjust the frequency for 200 Hz to 4 kHz and verify that the display indicates 0.0 dBm ±0.3 dB. Vary the frequency from 4 kHz to 20 kHz and verify that the display indicates 0.0 dBm ±0.5 dB.

5.2.4.2 Level Range

Place an external attenuator with an overall accuracy of ±0.1 or better between the send output and the receive input. Adjust the generator and attenuator for an input of 0.0 dBm ±0.1 dB at a frequency of 1000 Hz ±10 Hz. Vary the receive level over the range of +10.0 dBm to -40.0 dBm and verify that the display indicates the correct level, ±0.3 dB. Vary the receive level over the range of -40.0 dBm to -70.0 dBm and verify that the display indicates the correct level, ±1.0 dB.

5.2.5.3 C-Message Filter

Set the DBRN C-MSG pushbutton to the in position. Adjust the receive frequency to 2000 Hz ±10 Hz. Adjust the level so that the display flashes between +89 dBrn and +90 dBrn. Without changing the input level, change the input frequency to 3800 Hz ±20 Hz and verify that the display indicates +80 dBrn ±3 dBrn.

Set the input frequency to 2000 Hz ±10 Hz at a level of +90 dBrn. Without changing the level, change the input frequency to 1000 Hz ±10 Hz. Verify that the display indicates +40 dBrn or less.

5.2.5.4 3 kHz Filter

Set the DBRN 3 KHZ pushbutton to the in position. Set the input to a frequency of 400 Hz ±10 Hz. Adjust the level so that the display flashes between +89 dBrn and +90 dBrn. Without changing the receive level, change the input frequency to 3000 Hz ±10 Hz and verify that the display indicates +87 dBrn ±2 dBrn.

5.2.5.5 15 kHz Filter

Set the DBRN 15 KHZ pubhbutton to the in position. Set the input to a frequency of 400 Hz ±10 Hz. Adjust the level so that the display flashes between +89 dBrn and +90 dBrn. Without changing the receive level, change the input frequency to 15.00 kHz ±0.02 kHz and verify that the display indicates +87 dBrn ±2 dBrn.

5.2.5.6 Program Filter

Set the DBRN PROG pushbutton to the in position. Set the input to a frequency of 4.50 kHz ±0.02 kHz. Adjust the level so that the display flashes between +89 dBrn and +90 dBrn. Without changing the receive level, change the input frequency to 8.75 kHz ±0.02 kHz and verify that the display indicates +84 dBrn ±3 dBrn.

5.3 Corrective Maintenance

5.3.1 Troubleshooting

This section covers symptom analysis, circuit level troubleshooting and calibration procedures for the Model 42-10.

Accepted practices should be followed when repair is undertaken on main-frame components or the printed circuit boards. Recommended troubleshooting techniques are based on signal tracing methods where a known receive signal is used and the level and waveforms are verified as the signal progresses through the circuitry.

To gain access to the printed circuit board test and calibration points, the following procedure may be used:

Step 1. Remove the desired pair of printed circuit boards using the the procedures in Section 2.3.1.

Step 2. Insert the appropriate printed circuit extension board in the Model 42-10.

Step 3. Separate the board pair boards by removing the five mounting serews on either of the two boards.

Step 4. Insert the board pair into the socket on the extension board.

5.3.2 Symptom Analysis

The preventive maintenance checks of Section 5.2 are used to isolate the area in which malfunction occurs. Table 5-1 summarizes possible fault location for each of the preventive maintenance tests.

TABLE 5-1

SYMPTOM ANALYSIS

Preventive Maintenance Test	Probable Trouble Location
1. No response from any test	a. Ac power cord b. Fuse c. Internal ac wiring or power switch d. Power supply
2. 1004 Hz generator check (5.2.2.1)	a. Output amplifier (IC20, IC21 (42-401) b. 1004 filter IC1 (42-401) c. 1004 Hz divider IC1, IC2, IC3, or IC4 (42-301) d. Crystal oscillator or divider IC5, IC10, or IC11 (42-401) e. 1004 Hz switch S2 (42-401)
3. Generator frequency check (5.2.2.1)	a. VCO IC3 (42-401) b. Divider IC7, IC8, IC9 (42-401) c. Sine wave converter IC10, IC11 (42-401) d. Output filters IC9, IC11, IC12, IC13 (42-401) e. Discriminator IC5 (42-401) f. VCO control IC6, IC15 (42-401)
4. 100.4 Hz step test (5.2.2.3)	a. 100.4 Hz input IC13, IC14 (42-401) b. 100.4 step IC6, Q3 (42-401) c. Fixed frequency control IC14 (42-401)
5. Level range check (5.2.2.4)	a. Output amplifier IC20, IC21 (42-401) b. Output transformer T1 (42-401)
6. Frequency counter check (5.2.3)	a. Input or autorange amplifiers IC1, IC2, IC3, IC4, IC17 (42-101) b. Input IC8, IC9 (42-301) c. Resolution control IC6, IC7, IC13, IC14 (42-301) d. Counter control IC16, IC17, IC18, IC19, IC20 (42-301) e. Digit drivers Q1, Q2, Q3, Q4, IC20 42-301) f. Segment drivers Q5, Q6, Q7, Q8, Q9, Q10, Q11, IC20 (42-301)

TABLE 5-1 (Cont)

Preventive Maintenance Test	Probable Trouble Location
7. Audio monitor check (5.2.4)	a. Input amplifier IC1 (42-101) b. Summing amplifier IC18 (42-101) c. Monitor amplifier IC22, Q1, Q2 (42-101)
8. Receive frequency range check (5.2.5.1)	a. Input amplifier IC1 (42-101) b. Autorange amplifier IC17, IC2, IC3, IC4 (42-101) c. Detectors IC26, IC27, IC28 (42-201) d. Log converter IC20, IC31, IC32 (42-201)
9. Receive level check (5.2.5.2)	a. Autorange amplifier IC17, IC2, IC3, IC4 (42-101) b. DVM control IC14, IC15, IC16, IC17, IC19 (42-201) c. DVM counters IC19, IC10, IC11, IC12 (42-201) d. DVM display drivers IC5, IC6, IC7 (42-201)
10. C-Message filter check (5.2.5.3)	a. C-MSG filter IC9, IC10, IC11 (42-401) b. Switch S8 (42-101) c. Notch filter IC13, IC14, IC15, IC16 (42-101)
11. 3 kHz filter check (5.2.5.4)	a. 3 kHz filter IC8A (42-101) b. Switch S7 (42-101) c. Notch filter
12. 15 kHz filter check (5.2.5.5)	a. 15 kHz filter IC8A (42-101) b. Switch S6 (42-101) c. Notch filter
13. Program filter check (5.2.5.6)	a. Program filter IC6, IC7 (42-101) b. Switch S5 (42-101) c. Notch filter

5.3.3 Circuit Level Troubleshooting

The following sections describe the general procedures to be used in locating malfunctions. Where appropriate, performance standards, voltage levels, or waveform descriptions are provided to assist in the troubleshooting procedure. Unless otherwise stated, all voltage and frequency tolerances are ±10% and all dB tolerances are ±0.1 dB. When a circuit has the proper input signal, but the correct output cannot be measured, the components associated with that circuit should be checked and replaced if defective. Before detailed troubleshooting is undertaken, power supply voltages should be checked. Low supply voltages may result from a malfunctioning power supply or excessive current being drawn by a defective circuit. A defective integrated circuit may often be located by feeling the case temperature.

5.3.3.1 Power Supply (42-901 Board)

The power supply consists of a dual tracking ±9 V dc regulated supply and a separate +5 V dc regulated supply used to drive the LED displays.

With the POWER switch in the AC position, the rectified voltage across filter capacitors C1 and C2 should be +21 V dc and -21 V dc, respectively. This dc voltage will vary with the ac line voltage, from 18 V dc for low line voltage to 27 V dc for a high line voltage.

The +9 V dc output voltage is measured across C10. If a proper positive output voltage is measured, check the negative voltage regulator Q6, Q7, Q8, and Q9. If neither supply voltage is correct, initially check the positive regulator Q1, Q2, Q3, Q4, and Q5 which supplies the reference voltage to the negative voltage regulator through Q10.

The +5 V dc output voltage may be measured from the + side of C5 to ground. This voltage should be +5.0 V dc ±0.5 V dc. If this voltage is very high, check the voltage across C4 and R1. This voltage should be +12.0 V dc ±0.6 V dc.

To verify that improper operation of the power supply is not the result of an incorrect load, temporarily disconnect the cable connector from J1.

Remeasure the supply voltages. If these are normal, connect an ammeter in series with the test points and proper pin on J1. The value for both the plus and minus supplies should be about 135 mA. Currents substantially greater than these are a result of problems external to the power supply.

5.3.3.2 Power Supply - Battery Option (42-501 Board)

The power supply consists of a dual tracking ±9 V dc regulated supply and a separate +5 V dc regulated supply used to drive the LED displays. If the optional battery pack is supplied, then the power supply will also contain the battery chargers.

With the POWER switch in the AC position, the rectified voltage across filter capacitors C9 and C10 should be +21 V dc and -21 V dc, respectively. This dc voltage will vary with the ac line voltage, from 18 V dc for low line voltage to 27 V dc for a high line voltage.

The +9 V dc output voltage is measured across C15. If a proper positive output voltage is measured, check the negative voltage regulator Q9, Q10, Q11, and Q12. If neither supply voltage is correct, initially check the positive regulator Q4, Q5, Q6, and Q8 which supplies the reference voltage to the negative voltage regulator through Q13.

The +5 V dc output voltage may be measured from the + side of C24 to ground. This voltage should be +5.0 V dc ±0.5 V dc. If this voltage is very positive, then Q15 may be defective. Proper regulation of the supply may be verified by observing the waveform at Pin 1 of IC13. This waveform should be +8 V dc with short pulses to -8 V dc occurring at a 2.5 kHz rate. The duration of these pulses controls the on-time of pass transistors Q15 and Q17. Under normal operation, there will be a slight variation in the duration of these pulses. If this pulses are excessively long, then the control transistors Q14, Q15, Q16, or Q17 may be defective.

To verify that improper operation of the power supply is not the result of an incorrect load, temporarily disconnect the cable connector from J1. (Disconnecting J1 will disable the +5 V regulator by removing the 2.5 kHz clock. The 2.5 kHz clock may be externally connected using a short clip lead from Pin 1 or Pin 16 of J1 to C27.) Remeasure the supply voltages. If these are normal, connect an ammeter in series with the test points and proper pin on J1. The value for both the plus and minus supplies should be about 135 mA. Currents substantially greater than these are a result of problems external to the power supply.

The battery chargers may be checked by disconnecting the batteries from the unit. Check the battery charger open circuit voltage at C2 and C5. This voltage should be +13.9 V dc and -13.9 V dc, respectively. If these voltages are correct, measure the battery charger short circuit current. This is done by placing an ammeter from Terminal 6 to ground or from Terminal 9 to ground. In both cases, this current should be in the range of 200 to 250 mA.

5.3.3.3 Crystal Oscillator and Dividers (42-301 Board)

Using an oscilloscope with a calibrated time base, monitor the signal at Pin 13 of IC10 on the 42-301 board. This signal should be a 1 MHz, 9 V square wave. If this signal is not correct, check the 2 MHz oscillator IC5 or the divide by two IC10.

Monitor the signal at Pin 10 of IC5. This signal should be a 9 V pulse at a frequency of 100 kHz and a duty cycle of 40/60.

Monitor the signal at Pin 13 of IC11. This signal should be a 9 V pulse at a frequency of 10 kHz and duty cycle ratio of 40/60.

Monitor the signal at Pin 13 of IC12. This signal should be a 9 V pulse at a frequency of 100 Hz and a duty cycle ratio of 40/60.

5.3.3.4 1004 Hz Frequency Generator (42-301 Board)

Monitor the signal at Pin 11 of IC2. This signal should be a 6 V pulse whose duration is approximately 1.5 µs occurring every 498 µs.

Monitor the signal at Pin 3 of IC5. This signal should be a 6 V square wave at a frequency of 1004 Hz.

Monitor the signal at Pin 1 of IC1 on the 42-201 board. This signal should be a 1004 Hz sine wave at a level of +10.0 dBm ±1.5 dB (MIN. 2.061 V ac, OPT. 2.449 V ac, MAX. 2.911 V ac).

5.3.3.5 Frequency Generator (42-401 Board)

Any malfunction in the frequency generator can best be isolated by waveform tracing using the timing diagram in Figure 5-15. Set the controls for a generator output of 1000 Hz ±5 Hz at a level of 0.0 dBm ±0.5 dB (MIN. 0.7313 V ac, OPT. 0.7746 V ac, MAX. 0.8205 V ac).

Using the negative going edge of waveform C as a trigger, verify the correct operation of the generator by observing the correct waveforms at the test points listed. If the correct waveform is not observed, the gate or counter associated with that waveform is most likely defective.

At frequencies other than 1000 Hz, the waveform shapes will be the same but the time base will be different.

5.3.3.6 100.4 Hz Step (42-401 Board)

Using an oscilloscope, observe the waveform at Pin 1 of IC14. This waveform should be a short pulse varying from approximately -8 V to +8 V at a 100.4 Hz rate. The duration of the pulse at the bottom of the waveform should be approximately 30 µs.

If this waveform is not present, then IC14 is most likely defective. If this waveform is present, then IC13 or Q3 is most likely defective.

5.3.3.7 Send Filters (42-401 Board)

Using an oscilloscope, observe the signal at Pin 7 of IC19. As the generator frequency is varied from 200 Hz to 20 kHz, this output should be a clean sine wave with a peak value of 1.1 V ±0.2 V. If this signal is not present or has wide variations in signal level as the frequency is varied, then IC19 is most likely defective. If this signal is present over a portion of the frequency range, then comparators IC18 and IC19 or switches IC11, IC12, and IC13 may be defective.

At a frequency of 300 Hz, Pin 1 of IC17 should be approximately +7.5 V and IC12 should be switched on. At a frequency of 1000 Hz, the voltage at Pin 1 of IC18 should be +7.5 V and IC11 should be switched on. At a frequency of 5000 Hz, Pin 7 of IC18 should be approximately +7.5 V and IC13 should be switched on.

5.3.3.8 Send Amplifier (42-401 Board)

Adjust the operating controls for an output of 1000 Hz with a 600 Ω impedance. Using an ac voltmeter, monitor the signal at Pin 7 of IC20. As the LEVEL control is varied over its full range, this signal should vary over the range of at least -43.5 dB (5.8 mV ac) to +6.5 dB (1.637 V ac). If the signal does not vary over at least this range, then IC21 is most likely defective.

5.3.3.9 Frequency Counter (42-301 Board)

Set the controls to monitor the send frequency and adjust the send frequency to 1000 Hz. Monitor the signal at Pin 6 of IC8. This signal should be a square wave at the send frequency.

Monitor the signal at Pin 4 of IC7. This signal should be a square wave at 10 times the send frequency.

Monitor the signal at Pin 4 of IC20. This signal should be a 0 V dc logic level. Change the send frequency to 11 kHz and verify that the signal at Pin 10 of IC13 switches to +5 V dc logic level.

Monitor the signal at Pin 4 of IC20. This signal should be the same as the frequency at Pin 11 of IC13 which is gated on and off by the signal at Pin 1 of IC15. This signal at Pins 2 and 3 of IC20 should be short negative pulses with a pulse duration of approximately 2 µs.

If any one digit is not illuminated, then either the LED display or its digit driver is defective. The digit drivers are controlled by IC20 Pins 20 through 23. Under normal operation, each one of these pins is high for 25% of the time. If any segment on any one display is defective, then that display is most likely defective. If a segment is defective on all of the displays, then the segment driver is most likely defective. The segment drivers are controlled by IC20 Pins 20 through 19.

5.3.3.10 Audio Monitor (42-401 Board)

The audio monitor amplifier consists of IC22, Q1, and Q2 on the 42-401 board. Monitor the signal at Pin 5 of IC22. If no signal is present,

then IC17 or IC1 on the 42-101 board is most likely defective. If the signal is present, monitor the signal at the emitter of either Q1 and Q2. This signal should be an amplified version of the signal at Pin 5 of IC22. Some crossover distortion at this point is normal. If the signal is not present, then either IC22, Q1, or Q2 is defective. If the signal is present but no sound is heard, then the speaker is most likely defective.

5.3.3.11 Receive Amplifier (42-101 Baord)

Apply an input signal of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7836 V ac) at a frequency of 1 kHz. Monitor the signal at Pin 6 of IC1. This signal should be a 1 kHz sine wave at a level of approximately 0.0 dBm. If this signal is not present, then the input termination or blocking capacitors are most likely defective.

Monitor the signal at Pin 7 of IC17. This signal should be a 1 kHz sine wave at a level of 0.0 dBm ±0.5 dB (MIN. 0.7313 V ac, OPT. 0.7746 V ac, MAX. 0.8205 V ac). If this signal is not present, then either IC17 is defective or the send/receive switches Q1 through Q4 are defective.

Switching the 600 Ω and 900 Ω terminations should cause a gain change of less than ±0.2 dB at Pin 7 of IC17. If this gain change does not occur properly, then S1, S2, or S3 is most likely defective.

5.3.3.12 Notch Filter (42-101 Board)

Press the 3 KHZ filter button. Apply an input signal of 1000 Hz at a level of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7886 V ac). Monitor the signal at Pin 6 of IC1 and Pin 7 of IC12. Verify that the signal is present at Pin 7 of IC1, but is not present at Pin 7 of IC12. The level at Pin 7 of IC12 should drop at least 50 dB provided the total harminic distortion of the input signal is less than 56 dB.

If the correct signals are not present at Pin 7 of IC12, perform the notch filter calibration alignment as described in Section 5.3.4.2 of this manual. If any one section of the notch filter does not align properly, then that section of the filter is most likely defective.

5.3.3.13 C-Message Filter (42-101 Board)

Apply an input signal of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7836 V ac) at a frequency of 2 kHz, and monitor the signal at Pin 7

of IC9, Pins 1 and 7 of IC11. The 2 kHz signal should be present at each one of these points with a slight variation in level. If the signal is present at one point but not at the next point, then that IC is most likely defective.

5.3.3.14 3 kHz Filter (42-101 Board)

Apply an input signal of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7836 V ac) at a frequency of 2 kHz. Monitor the signal at Pin 7 of IC8 and Pin 7 of IC12. The 2 kHz signal should be present at both of these with the level at Pin 1 of IC8 about 0.5 dBm below the level at Pin 7 of IC12. If the correct level is not present, then IC8 is most likely defective.

5.3.3.15 15 kHz Filter (42-101 Board)

Apply an input signal of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7836 V ac) at a frequency of 2 kHz. Monitor the signal at Pin 7 of IC8 and Pin 7 of IC12. The 2 kHz signal should be present at both of these points at the same level, ±0.2 dB. If the correct level is not present, then IC8 is most likely defective.

5.3.3.16 Program Filter (42-101 Board)

Apply an input signal of -6.0 dBm (MIN. 0.3838 V ac, OPT. 3882 V ac, MAX. 0.3927 V ac) at a frequency of 4.5 kHz. Monitor the signal at Pin 7 of IC12, Pins 7 and 1 of IC7 and Pin 1 of IC6. The signal should be present at each of these points at approximately the same level. If the signal is present at one point but not the next point, then that IC is most likely defective.

5.3.3.17 Autorange Filter (42-101 Board)

Set the controls to monitor the receive level and apply an input signal at a frequency of 1000 Hz at a level of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7836 V ac). Monitor this signal at Pin 6 of IC15. This signal should be the 1000 Hz sine wave at a level of 0.0 dBm ±0.5 dB (MIN. 0.7313 V ac, OPT. 0.7746 V ac, Max. 0.8205 V ac). If this signal is not present, then IC15 or Q10 may be defective.

Decrease the input level to -20.0 dBm. The level at Pin 6 of IC5 and Pin 1 of IC2 should be 0.0 dBm ±0.5 dB (MIN. 0.7313 V ac, OPT. 0.7746 V ac, MAX. 0.8205 V ac). If this signal is not present, then IC12 or Q11 may be defective.

Decrease the input level to -40.0 dBm. Monitor the signal at Pin 6 of IC5 and Pin 1 of IC3. This signal level should be 0.0 dBm ±0.5 dB (MIN. 0.7313 V ac, OPT. 0.7746 V ac, Max. 0.9205 V ac). If the signal is not present at IC5 but is present at IC4, then Q13 is most likely defective. If the signal is not present at IC4, then IC4 is most likely defective.

5.3.3.18 Detectors (42-201 Board)

Apply an input signal of 0.0 dBm (MIN 0.7657 V ac, OPT. 0.7746 V ac, MAX. 0.7836 V ac) at a frequency of 2 kHz. Monitor the signal at Pins 1 and 7 of IC28. These signals should both be approximately +1.9 V dc. If the correct signal is present at Pin 7 of IC28 but not at Pin 1, then IC27 is most likely defective. If the correct signal is not present at either point, monitor the waveform at the anode of D1. This signal should be a negative-going half-wave rectified sine wave. If this signal is correct, then IC28 is most likely defective.

5.3.3.19 Log Converter (42-201 Board)

Apply an input signal of 1000 Hz at a level of 0.0 dBm (MIN. 0.7657 V ac, OPT. 0.7746 V ac, MAX 0.7836 V ac). Using Figure 5-16 as a guide, monitor the waveform at the test point indicated. If the correct waveform is not present at a particular test point, then the IC pertaining to that test point is most likely defective.

5.3.3.20 Digital Voltmeter Controls (42-201 Board)

Set the controls to monitor the receive level. Apply an input signal of 1000 Hz at a level of 0.0 dBm. Monitor the signal at the collectors of Q5 and Q6. A high signal corresponds to a voltage of +5 V. A low signal corresponds to a level of 0 V.

With an input of 0.0 dBm, both Q5 and Q6 should be low.

With a level of -20.0 dBm, Q5 should be high and Q6 should be low.

With an input level of -40.0 dBm, Q5 should be low and Q6 should be high.

With an input level of -60.0 dBm, both Q5 and Q6 should be high.

The following measurements are made on the 42-201 board.

With an input signal of 0.0 dBm, Pin 12 of IC10 should be high and Pins 3, 4, and 13 should be low.

With an input level of -20.0 dBm, Pin 13 of IC10 should be high and Pins 2, 4, and 12 should be low.

With an input level of -40.0 dBm, Pins 12 and 13 of IC10 should be high and Pins 3 and 4 should be low.

With an input level of -60.0 dBm, Pin 3 of IC10 whould be high and Pins 4, 12, and 13 should be low.

5.3.3.21 Digital Voltmeter Segment Drivers (42-201 Board)

Set the controls to monitor the receive level. Apply an input signal of 1000 Hz at a level of 0.0 dBm.

The information from counters IC10 through IC12 is coupled to segment drivers IC5 through IC7 in a BCD format. If the correct segments are not illuminated, verify that the correct BCD code is present at the input to the segment driver. If the correct code is present but the correct segment is not illuminated, then the segment is most likely defective. If the correct code is not present, then the counter corresponding to that segment driver is most likely defective.

5.3.4 Calibration

The following procedures are used to recalibrate the generator and receiver circuitry. Recalibration is normally required when maintenance has been performed on associated circuitry or when there is a reason to suspect that calibration is no longer accurate.

5.3.4.1 Power Supply (42-901 Board)

Step 1. Connect a digital dc voltmeter from the positive end of C10 to ground.

Step 2. Adjust R8 for a reading of 9.00 V dc ±0.02 V dc on the digital voltmeter.

Step 3. Connect the digital voltmeter from the negative end of C14 to ground.

Step 4. Verify that the reading on the digital voltmeter is -9.00 V dc ±0.02 V dc. If not, readjust R8 so that both the positive and negative supply voltages are within the tolerance limits.

5.3.4.2 Power Supply - Battery Option (42-501 Board)

Step 1. Connect a digital dc voltmeter from the positive end of C14 to ground.

Step 2. Adjust R17 for a reading of 9.00 V dc ±0.02 V dc on the digital voltmeter.

Step 3. Connect the digital voltmeter from the negative end of C15 to ground.

Step 4. Verify that the reading on the digital voltmeter is -9.00 V dc ±0.02 V dc. If not, readjust R17 so that both the positive and negative supply voltages are within the tolerance limits.

Step 5. Set the HIGH/FLOAT voltage switch to FLOAT.

Step 6. Remove the batteries from the unit.

Step 7. Connect the digital voltmeter from the positive end of C2 to ground.

Step 8. Adjust R3 for the correct reading on the digital voltmeter as listed below.

Step 9. Connect the digital voltmeter from the negative end of C5 to ground.

Step 10. Adjust R7 for the correct reading on the digital voltmeter as listed below.

Step 11. Reconnect the batteries to the unit.

CHARGER FLOAT VOLTAGE

Eagle-Picher Battery Part No. CF12V1.5

Adjust R3 for +14.5 V dc ±0.1 V dc.

Adjust R7 for -14.5 V dc ±0.1 V dc.

Globe Battery Part No. GC1215D

Adjust R3 for +14.1 V dc ±0.1 V dc.

Adjust R7 for -14.1 V dc ±0.1 V dc.

5.3.4.3 Notch Filter Alignment (42-101 Board)

Step 1. Set the C-MSG pushbutton to the in position.

Step 2. Set the RECEIVE TERM and the RECEIVE 600 Ω pushbuttons to the in position.

Step 3. Apply an input frequency of 1010 Hz ±1 Hz at a level of 0.0 dBm ±0.2 dBm to the Model 42-10 input.

Step 4. Monitor the notch filter output at Pin 7 of IC17 using an ac voltmeter.

Step 5. Using short clip leads, place jumper wires across capacitors C60, C62, and C65.

Step 6. Adjust R114 and R136 for a null on the ac voltmeter. If either adjustment reduces the ac voltage reading, you must repeat the other adjustment until the ac voltage reading cannot be nulled further by either adjustment.

Note: Typical notch depth is approximately 60 dB.

Step 7. Remove the jumper wire from C60 and connect it across C57.

Step 8. Adjust R119 and R142 for a null on the ac voltmeter. If either adjustment reduces the ac voltage reading, you must repeat the other adjustment until the ac voltage reading cannot be nulled further by either adjustment.

Step 9. Remove the jumper wire from C62 and connect it across C60.

Step 10. Adjust R125 and R146 for a null on the ac voltmeter. If either adjustment reduces the ac voltage reading, you must repeat the other adjustment until the ac voltage reading cannot be nulled further by either adjustment.

Note: Typical notch depth is approximately 60 dB.

Step 11. Remove the jumper wire from C65 and connect it across C62.

Step 12. Adjust R129 and R152 for a null on the ac voltmeter. If either adjustment reduces the ac voltage reading, you must repeat the other adjustment until the ac voltage reading cannot be nulled further by either adjustment.

Note: Typical notch depth is approximately 60 dB.

Step 13. Remove the jumper wire across C57, C60, and C62.

5.3.4.4 Level Detecting Calibration (42-201 Board)

Step 1. Set the DBM REC pushbutton to the in position.

Step 2. Set the RECEIVE TERM and the RECEIVE 600 Ω pushbuttons to the in position.

Step 3. Monitor the dc voltage at Pin 7 of IC28 using a digital dc voltmeter.

Step 4. Set the input signal to a frequency of 1010 Hz ±10 Hz at a level below -20.0 dBm and then increase to -10.00 dB ±0.05 dBm (MIN. 0.2435 V ac, OPT. 0.2449 V ac, MAX. 0.2462 V ac).

Step 5. Adjust R14 on the 42-101 board for a reading of 6.000 V dc ±0.006 V dc on the digital voltmeter.

Step 6. Set the input level above -8.0 dBm and then decrease to -10.00 dBm ±0.05 dBm (MIN. 0.2435 V ac, OPT. 0.2449 V ac, MAX. 0.2464 V ac).

Step 7. Adjust R6 for a reading of 0.600 V dc ±0.002 V dc on the digital voltmeter.

Step 8. Repeat Steps 4 through 7 until no further adjustment is required.

5.3.4.5 Log Converter Calibration (42-201 Board)

Step 1. Set the DBM REC pushbutton to the in position.

Step 2. Set the RECEIVE TERM and the RECEIVE 600 Ω pushbuttons to the in position.

Step 3. Set the input signal to 1000 Hz ±5 Hz at a level of below -20.0 dBm and then increase to -10.00 dBm ±0.05 dBm (MIN. 0.2435 V ac, OPT. 0.2449 V ac, MAX. 0.2464 V ac).

Step 4. Adjust R27 for a reading of -10.0 dBm on the Model 42-10.

Step 5. Set the input signal level above -8.0 dBm and then decrease to -10.00 dBm ±0.05 dBm (MIN. 0.2435 V ac, OPT. 0.2449 V ac, MAX. 0.2464 V ac).

Step 6. Adjust R32 for a reading of -10.0 dBm on the Model 42-10.

Step 7. Repeat Steps 3 throgh 6 until no further adjustment is required.

5.3.4.6 Noise Detecting Calibration (42-201 Board)

Step 1. Set the DBRN 15 KHZ pushbutton to the in position. (If unit has NOTCH IN/OUT option, switch to the IN position.)

Step 2. Set the RECEIVE TERM and the RECEIVE 600 Ω pushbuttons to the in position.

Step 3. Monitor the dc voltage at Pin 1 of IC28 using a digital dc voltmeter.

Step 4. Set the input signal to a frequency of 2000 Hz ±10 Hz at a level below -20.0 dBm and then increase to -10.00 dBm ±0.05 dBm (MIN. 0.2435 V ac, OPT. 0.2449 Vac, MAX. 0.2464 V ac.)

Step 5. Adjust R110 on the 42-101 board for a reading of 6.356 V dc ±0.012 V dc on the digital voltmeter.

Step 6. Set the input level above -8.0 dBm and then decrease to -10.00 dBm ±0.05 dBm.

Step 7. Adjust R21 for a reading of 0.6356 V dc ±0.0020 V dc on the digital voltmeter.

Step 8. Repeat Steps 4 through 7 until no further adjustment is required.

5.3.4.7 Filter Level Adjustments (42-201 Board)

Step 1. Perform procedures listed in Section 5.3.4.5.

Step 2. Set the DBRN C-MSG pushbutton to the in position.

Step 3. Set the RECEIVE TERM and RECEIVE 600 Ω pushbuttons to the in position.

Step 4. Set the input level below -12.0 dBm and then increase to -10.00 dBm ±0.05 dBm (MIN. 0.2435 V ac, OPT. 0.2449 V ac, MAX.).2464 V ac).

Step 5. Adjust R100 on the 42-101 board for a reading of 5.472 V dc ±0.018 V dc on the digital voltmeter connected to Pin 1 of IC28.

Step 6. Set the DBRN PROG pushbutton to the in position.

Step 7. Set the input signal to a frequency of 4000 Hz ±20 Hz at a level of -18.00 dBm ±0.05 dBm (MIN. 96.9 mV ac, OPT. 97.5 mV ac, MQX. 98.1 mV ac).

Step 8. Adjust R70 on the 42-101 board for a reading of 5.347 V dc ±0.018 V dc on the digital voltmeter.

5.3.4.8 Low Freqeuncy Set (42-401 Board)

Step 1. Set the GENERATOR-KHZ CONT pushbutton to the in position.

Step 2. Monitor the output signal at the output terminal using an ac voltmeter, frequency counter, and oscilloscope.

Step 3. Set the LEVEL control for an output of -10.0 dBm ±0.2 dBm (MIN. 0.2394 V ac, OPT. 0.2449 V ac, MAX. 0.2506 V ac).

Step 4. Set the FREQUENCY control on the Model 42-10 to the fully counterclockwise position.

Step 5. Adjust R97 for an output frequency of 35 Hz ±2 Hz.

5.3.4.9 Signal Purity Adjustment (42-401 Board

Step 1. Set the FREQUENCY control on the Model 42-10 for an output of 1010 Hz ±10 Hz.

Step 2. Set the LEVEL control for an output of 0.0 dBm ±0.2 dBm (MIN. 0.7570 V ac, OPT. 0.7746 V ac, MAX. 0.7926 V ac).

Step 3. Connect the Model 42-10 SEND output to an HP 334A Distortion Analyzer or equivalent.

Step 4. Adjust R67 and R74, in turn, for a minimum reading on the Distortion Analyzer.

5.3.4.10 Fixed Frequency Adjustment (42-401 Board) (402 HZ)

Step 1. Set the pushbutton to the left of the GENERATOR-KHZ 1.004 pushbutton to the in position.

Step 2. Short together Terminals "N" and "P" of the 42-301-101 board and adjust R115 for the correct output frequency ±3 kHz.

Step 3. Set the pushbutton to the right of the GENERATOR-KHZ 1.004 pushbutton to the in position. (2811 HZ)

Step 4. Short together Terminals "N" and "P" of the 42-301-101 board and adjust R118 for the correct output frequency ±5 Hz.

5.3.4.11 Send Level Calibration (42-401 Board)

Step 1. Set the GENERATOR-KHZ CONT pushbutton, the LEVEL VAR pushbutton and the SEND 600 Ω pushbutton to the in position.

Step 2. Connect a load resistor of 600.0 Ω ±0.6 Ω to the SEND output jack.

Step 3. Connect a digital ac voltmeter across the 600 Ω load resistor.

Step 4. Vary the FREQUENCY and LEVEL controls for an output frequency of 1004 Hz ±5 Hz at a level of 0.7746 V ac ±0.0025 V ac as read on the digital ac voltmeter.

Step 5. Set the DBM SEND pushbutton to the in position and adjust R107 on the 42-201-101 board for a reading of ±0.0 dBm on the Model 42-10.

Step 6. Set the GENERATOR-KHZ 1.004 pushbutton to the in position.

Step 7. Adjust R21 for a reading of 0.7746 V ac ±0.0025 V ac on the digital ac voltmeter.

Step 8. Set the LEVEL fixed DBM pushbutton to the in position.

Step 9. Adjust R127 for the correct fixed output level as read on the Model 42-10.

DOC #: ** MODEL ASSEMBLY INDEX ** DATE: 5/12/81
MODEL: 4210A NAME: TRANSMISSION TEST SET 42-10 AC

ASSEMBLY NO.	DESCRIPTION	PAGE
D4210A-0	MECHANICAL ASSY	5-23
D4210A-0-1	TOP MECHANICAL ASSY	5-24
D4210A-0-1-1	FRONT PANEL ASSY	5-25
D4210A-0-1-1-1	HOLD CIRCUIT ASSY	5-26
D4210A-0-2	BOTTOM MECHANICAL ASSY	5-27
D4210A-0-2-0	MECHANICAL PWR SUPPLY ASSY	5-28
D4210A-0-2-1	AC PWR SUPPLY BD ASSY	5-29
D4210A-0-3	COVER MECHANICAL ASSY	5-31
D4210A-0-4	WIRE ASSY	5-32
D4210A-1	MECHANICAL ASSY FOR 100/200 BD	5-33
D4210A-1-1	100 BD ASSY	5-34
D4210A-1-2	200 BD ASSY	5-40
D4210A-1-2-1	DISPLAY BD ASSY	5-44
D4210A-2	MECHANICAL ASSY FOR 300/400 BD	5-45
D4210A-2-1	300 BD ASSY	5-46
D4210A-2-1-1	DISPLAY BD ASSY	5-40
D4210A-2-2	400 BD ASSY	5-50
D4210A-2-2-1	POT BD ASSY	5-54

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DOC #: ** MODEL ASSEMBLY INDEX ** DATE: 5/12/81
MODEL: 4210B NAME: TRANSMISSION TEST SET 42-10 BATT/AC

ASSEMBLY NO.	DESCRIPTION	PAGE
D4210B-0	MECHANICAL ASSY	5-55
D4210B-0-1	TOP MECHANICAL ASSY	5-56
D4210B-0-1-1	FRONT PANEL ASSY	5-57
D4210A-0-1-1-1	HOLD CIRCUIT ASSY	5-58
D4210B-0-2	BOTTOM MECHANICAL ASSY	5-59
D4210B-0-2-0	PWR SUPPLY MECHANICAL ASSY	5-60
D4210B-0-2-1	BATT/AC PWR SUPPLY BD ASSY	5-61
D4210B-0-3	COVER MECHANICAL ASSY	5-64
D4210B-0-4	WIRE ASSY	5-65
D4210A-1	MECHANICAL ASSY FOR 100/200 BD	5-66
D4210A-1-1	100 BD ASSY	5-67
D4210A-1-2	200 BD ASSY	5-73
D4210A-1-2-1	DISPLAY BD ASSY	5-77
D4210A-2	MECHANICAL ASSY FOR 300/400 BD	5-78
D4210A-2-1	300 BD ASSY	5-79
D4210A-2-1-1	DISPLAY BD ASSY	5-82
D4210A-2-2	400 BD ASSY	5-83
D4210A-2-2-1	POT BD ASSY	5-87

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DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0
DESCRIPTION: MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
12	24A06005A	SCREW 6-32 X 5/16 BH-SL-SNP
SUB	D4210-0-3	COVER MECHANICAL ASSY
SUB	D4210A-0-1	TOP MECHANICAL ASSY
SUB	D4210A-0-2	BOTTOM MECHANICAL ASSY
SUB	D4210A-0-4	WIRE ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-1
DESCRIPTION: TOP MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
2	19F00008	CONN EDGE 22 POSITION DUAL CONTACT
4	23A00038	SPACER 1/4 OD X 1/8 #4 BRASS
2	23B00006	FASTNER ASSEMBLY
1	23D00032	CLAMP CABLE
2	23Z00005	CARD GUIDE
4	24A04012A	SCREW 4-40 X 3/4 BH-SL-SNP
4	24A04102	WASHER FLAT #4 SCP
4	24A04104	WASHER EXT TOOTH #4
10	24A06004A	SCREW 6-32 X 1/4 BH-SL-SNP
4	24A06004C	SCREW 6-32 X 1/4 FH-SL-SNP
5	24A06006A	SCREW 6-32 X 3/8 BH-SL-SNP
11	24A06104	WASHER EXT TOOTH #6
11	24A06204	NUT HEX 6 - 32 X 5/16 SNP
1	F42-008D	C CONNECTOR SUPPORT
1	F42-88A	C COVER 42-10
SUB	D4210A-0-1-1	FRONT PANEL ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-1-1
DESCRIPTION: FRONT PANEL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
1	13B11000A	RES CARBON 10K 10% .5W 1 TURN
2	13B12000	RES WIREWOUND 20K 5% 2W 10 TURN
1	17B00002	TRANSDUCER 340 OHM
4	19B00003	CONN FERRULE
4	19C00004	CONN BINDING POST RED
1	19C00007	CONN BINDING POST METAL
2	19D00004	CONN PHONE 3 CONTACT
2	19D00005	CONN PHONE 2 CONTACT
2	19Z00004	CUFF LINK DIAL POST
2	21E00013	SWITCH TOGGLE 2 POLE 2 THROW
1	21E00015	SWITCH TOGGLE 3 POLE 2 THROW
1	21E00017	SWITCH TOGGLE 3 POLE 2 THROW
1	21E00018	SWITCH TOGGLE 4 POLE 2 THROW
2	21Z00006	SWITCH CAP WHITE
3	21Z00007	SWITCH CAP YELLOW
1	23C00005	KNOB 1/8
2	23C00013	KNOB 1/4 BLACK
1	23D00029	CLAMP 1/8 CABLE
2	23J00004	INSULATOR MICA
2	23L00003	HANDLE RD BLACK
2	24A04003C	SCREW 4-40 X 3/16 FH-SL-SNP
4	24A08010A	SCREW 8-32 X 5/8 BH-SL-SNP
4	24A08101	WASHER EXT TOOTH #8
1	24A08102	WASHER FLAT #8
3	24C00006	LUG 1416-6
2	24Z00006	NUT HEX 3/8 - 32 X 1/2 BNP
1	24Z00019	WASHER FIBER 3/8
4	24Z00023	WASHER 3/8
4	24Z00024	WASHER SHOULDER #6 NYLON
2	26D00001	COMMUNICATIONS GAP
1	F42-011	A DISPLAY WINDOW BRACKET
1	F42-012A	A DISPLAY WINDOW
1	F42-013A	A SPEAKER BRACKET
1	F42-016A	B BRACKET, SWITCH NOISE TO GROUND
1	F42-090C	C F.P. DETAIL 42-10 STD
SUB	D4210A-0-1-1-1	HOLD CIRCUIT ASSY
REF	B42-094	42-10 SILKSCREEN
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-1-1-1
DESCRIPTION: HOLD CIRCUIT ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01G32200	CAP TANT ELEC 2.2uF 10% 20V
D1	03J00001	DIODE BRIDGE KBP04 400V 1.5A
L1	15A01000	INDUCTOR 1.0MH 5%
L2	15A01000	INDUCTOR 1.0MH 5%
Q1	05C02484	TRANSISTOR NPN 2N2484
Q2	05D00007	TRANSISTOR NPN MPS-A14
Q3	05D00002	TRANSISTOR NPN MJE182
R1	12F31000	RES METAL FILM 1.00M 1% 1/4W
R2	12FC3090	RES METAL FILM 30.9 OHM 1% 1/4W
1	24A04303	PEM NUT KFS2-440
1	F42-602-3	B PC D&T HOLD CIRCUIT
REF	B42-603	COMPONENT LAYOUT
REF	B42-604	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-2
DESCRIPTION: BOTTOM MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
T1	16B00009	TRANSFORMER POWER
2	01A11000A1	CAP CER .01uF 8MV 1.6KV
1	19M00005	CONN POWER CORD
1	19Q00003	CONN HAY RAKE 3 CONTACT
1	21C00004	SWITCH SLIDE 2 POLE 2 THROW
1	21E00013	SWITCH TOGGLE 2 POLE 2 THROW
1	21Z00005	SWITCH CAP RED
1	23A00065	SPACER SPLIT ROLLED ALUM 1/4 X 1/2
2	23B00010	FASTNER LID
1	23D00027	TIE RAP
1	23D00040	HOLDER FUSE
1	23D00042	STRAIN RELIEF
4	23E00002	RUBBER FEET
1	23H00009	TILT STAND RETRACTABLE
2	24A04004A	SCREW 4-40 X 1/4 BH-SL-SNP
3	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
4	24A04102	WASHER FLAT #4 SCP
5	24A04104	WASHER EXT TOOTH #4
7	24A06005A	SCREW 6-32 X 5/16 BH-SL-SNP
6	24A06006A	SCREW 6-32 X 3/8 BH-SL-SNP
6	24A06007A	SCREW 6-32 X 7/16 BH-SL-SNP
2	24A06008A	SCREW 6-32 X 1/2 BH-SL-SNP
2	24A06010A	SCREW 6-32 X 5/8 BH-SL-SNP
4	24A06102	WASHER FLAT #6 SCP
17	24A06104	WASHER EXT TOOTH #6
11	24A06203	NUT HEX 6 - 32 X 1/4 SNP
4	24A06205	LOCKING NUT NYLON INSERT 6 - 32
1	26A00001	FUSE 1 AMP SB
1	F42-010C	A XFMR HOLDER, POWER BRACKET
1	F42-014	A COVER PLATE BATTERY
1	F42-02D	C BOTTOM COVER
1	F42-04D	C POWER SUPPLY BRACKETS
1	F42-86	C REAR COVER 42-10
1	F42-89	C REAR PANEL 42-10
SUB	D4210A-0-2-0	MECHANICAL PWR SUPPLY ASSY
SUB	D4210A-0-2-1	AC PWR SUPPLY ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-2-0
DESCRIPTION: MECHANICAL PWR SUPPLY ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
4	23J00004	INSULATOR MICA
4	24A04008A	SCREW 4-40 X 1/2 BH-SL-SNP
4	24A04102	WASHER FLAT #4 SCP
4	24A04104	WASHER EXT TOOTH #4
5	24A04205	NUT HEX 4 - 40 X 3/16 SNP
3	24Z00022	WASHER COMPRESSION
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-2-1
DESCRIPTION: AC PWR SUPPLY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01H61000A	CAP AL ELEC 1000uF -10 +75% 40V
C2	01H61000A	CAP AL ELEC 1000uF -10 +75% 40V
C3	01E24700	CAP POLYCARB .47uF 5% 100V
C4	01E24700	CAP POLYCARB .47uF 5% 100V
C5	01H52200A	CAP AL ELEC 220uF -10 +50% 25V
C6	01A14700	CAP CER .047uF 20% 50V
C7	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C9	01A21000A	CAP CER .1uF 20% 20V
C10	01G42200	CAP TANT ELEC 22uF 10% 15V
C11	01A14700	CAP CER .047uF 20% 50V
C12	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C14	01G42200	CAP TANT ELEC 22uF 10% 15V
C15	01A21000A	CAP CER .1uF 20% 20V
C16	01A14700	CAP CER .047uF 20% 50V
C17	01A21000A1	CAP CER .1uF 20% 25V
D1	03E04004	DIODE RECTIFIER 1N4004 400V 1A
D2	03E04004	DIODE RECTIFIER 1N4004 400V 1A
D3	03C00823A	DIODE ZENER 1N823A 6.2V 5%
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03J00001	DIODE BRIDGE KBP04 400V 1.5A
IC1	10A07812	IC REGULATOR 7812
IC2	10A07805	IC REGULATOR 7805
J1	20A00002	SOCKET IC 16 PIN
Q1	05A05194	TRANSISTOR PNP 2N5194
Q2	05A04403	TRANSISTOR PNP 2N4403
Q3	05B00015	TRANSISTOR PNP MPS-A64
Q4	05D00010	TRANSISTOR NPN MPS-U01A
Q5	05C04401	TRANSISTOR NPN 2N4401
Q6	05C04401	TRANSISTOR NPN 2N4401
Q7	05B00012	TRANSISTOR PNP MPS-U51A
Q8	05C05192	TRANSISTOR NPN 2N5192
Q9	05A04403	TRANSISTOR PNP 2N4403
Q10	05C04401	TRANSISTOR NPN 2N4401
R1	12B21100	RES CARBON 110K 5% 1/4W
R2	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R3	12B01000	RES CARBON 1K 5% 1/4W
R4	12B11000	RES CARBON 10K 5% 1/4W
R5	12B01000	RES CARBON 1K 5% 1/4W
R6	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R7	12FD4420	RES METAL FILM 442 OHM 1% 1/4W
R8	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R9	12F02740	RES METAL FILM 2.74K 1% 1/4W
R10	12B11000	RES CARBON 10K 5% 1/4W
R11	12BD1000	RES CARBON 100 OHM 5% 1/4W
R12	12B11000	RES CARBON 10K 5% 1/4W
R13	12B01000	RES CARBON 1K 5% 1/4W
R14	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R15	12F11000	RES METAL FILM 10.0K 1% 1/4W
R16	12BD1000	RES CARBON 100 OHM 5% 1/4W
R17	12B01000	RES CARBON 1K 5% 1/4W
R18	12F11000	RES METAL FILM 10.0K 1% 1/4W
R19	12B11000	RES CARBON 10K 5% 1/4W
R20	12BD3900	RES CARBON 390 OHM 5% 1/4W
R21	12BD3900	RES CARBON 390 OHM 5% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-2-1
DESCRIPTION: AC PWR SUPPLY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
8	19R00003	CONN TERMINAL
2	F-HLI-050	B CAPACITOR SPACER
1	F42-902B	C PC D&T POWER SUPPLY
REF	C42-903B	COMPONENT LAYOUT
REF	D42-904	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-3
DESCRIPTION: COVER MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
1	23L00004	HANDLE
1	24A06004A	SCREW 6-32 X 1/4 BH-SL-SNP
7	24A06104	WASHER EXT TOOTH #6
7	24A06203	NUT HEX 6 - 32 X 1/4 SNP
1	F42-87	C PORTABLE LID 42-10
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-4
DESCRIPTION: WIRE ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
1	F42-71	B MODEL 42 AC CABLE HARNESS
1	F42-078	CABLE MODEL 42-10
REF	A42-76	
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1
DESCRIPTION: MECHANICAL ASSY FOR 100/200 BD

REF DES./QTY	STOCK NO.	DESCRIPTION
5	23A00030	SPACER 8327 1/40D X 1 LG
10	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
10	24A04102	WASHER FLAT #4 SCP
10	24A04104	WASHER EXT TOOTH #4
SUB	D4210A-1-1	100 BD ASSY
SUB	D4210A-1-2	200 BD ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01A04700	CAP CER 4700PF 10% 250V
C2	01G42200	CAP TANT ELEC 22uF 10% 15V
C3	01B00150C	CAP MICA 150PF 5% 500V
C4	01G42200	CAP TANT ELEC 22uF 10% 15V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G42200	CAP TANT ELEC 22uF 10% 15V
C7	01A00010	CAP CER 10PF 0.5PF 1KV
C8	01A11000	CAP CER .01uF 20% 50V
C9	01G42200	CAP TANT ELEC 22uF 10% 15V
C10	01A11000	CAP CER .01uF 20% 50V
C11	01A11000	CAP CER .01uF 20% 50V
C12	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C13	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C14	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C15	01A11000	CAP CER .01uF 20% 50V
C16	01A11000	CAP CER .01uF 20% 50V
C17	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C18	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C19	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C20	01A11000	CAP CER .01uF 20% 50V
C21	01D11000	CAP POLYSTY .01uF 1% 33V
C22	01D05000	CAP POLYSTY 5000PF 1% 33V
C23	01D11000	CAP POLYSTY .01uF 1% 33V
C24	01D05000	CAP POLYSTY 5000PF 1% 33V
C25	01D11000	CAP POLYSTY .01uF 1% 33V
C26	01D01500	CAP POLYSTY 1500PF 1% 33V
C27	01D04700	CAP POLYSTY 4700PF 1% 33V
C28	01D01500	CAP POLYSTY 1500PF 1% 33V
C29	01D07500	CAP POLYSTY 7500PF 1% 33V
C30	01D01000	CAP POLYSTY 1000PF 1% 33V
C31	01D11500	CAP POLYSTY .015uF 1% 33V
C32	01B00270C	CAP MICA 270PF 5% 500V
C33	01E24700	CAP POLYCARB .47uF 5% 100V
C34	01D11000	CAP POLYSTY .01uF 1% 33V
C35	01D11000	CAP POLYSTY .01uF 1% 33V
C36	01D01500	CAP POLYSTY 1500PF 1% 33V
C37	01D11000	CAP POLYSTY .01uF 1% 33V
C38	01D11000	CAP POLYSTY .01uF 1% 33V
C39	01D11000	CAP POLYSTY .01uF 1% 33V
C40	01D02700	CAP POLYSTY 2700PF 1% 33V
C41	01D00220	CAP POLYSTY 220PF 1% 160V
C42	01D11300	CAP POLYSTY .013uF 1% 33V
C43	01D04700	CAP POLYSTY 4700PF 1% 33V
C44	01D03900	CAP POLYSTY 3900PF 1% 33V
C45	01D11000	CAP POLYSTY .01uF 1% 33V
C46	01H47500	CAP AL ELEC 75uF -10 +50% 100V
C47	01A11000	CAP CER .01uF 20% 50V
C50	01H47500	CAP AL ELEC 75uF -10 +50% 100V
C51	01B00150C	CAP MICA 150PF 5% 500V
C53	01B00082C	CAP MICA 82PF 5% 500V
C54	01E22200	CAP POLYCARB .22uF 5% 250V
C56	01D11000	CAP POLYSTY .01uF 1% 33V
C57	01D11000	CAP POLYSTY .01uF 1% 33V
C58	01B00470C	CAP MICA 470PF 5% 500V

DOC NO:
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

PARTS LIST BY ASSEMBLY

DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
C59	01D11000	CAP POLYSTY .01uF 1% 33V
C60	01D11000	CAP POLYSTY .01uF 1% 33V
C61	01D11000	CAP POLYSTY .01uF 1% 33V
C62	01D11000	CAP POLYSTY .01uF 1% 33V
C63	01B00043C	CAP MICA 43PF 5% 500V
C64	01D11000	CAP POLYSTY .01uF 1% 33V
C65	01D11000	CAP POLYSTY .01uF 1% 33V
C66	01G42200	CAP TANT ELEC 22uF 10% 15V
C67	01G42200	CAP TANT ELEC 22uF 10% 15V
C68	01A21000	CAP CER .1uF 20% 10V
C69	01A21000	CAP CER .1uF 20% 10V
C70	01A21000	CAP CER .1uF 20% 10V
C71	01A21000	CAP CER .1uF 20% 10V
C72	01A21000	CAP CER .1uF 20% 10V
C73	01A21000	CAP CER .1uF 20% 10V
C74	01A21000	CAP CER .1uF 20% 10V
C75	01A21000	CAP CER .1uF 20% 10V
C76	01A21000	CAP CER .1uF 20% 10V
C77	01A21000	CAP CER .1uF 20% 10V
C78	01A21000	CAP CER .1uF 20% 10V
C79	01A21000	CAP CER .1uF 20% 10V
C80	01A21000	CAP CER .1uF 20% 10V
C81	01A21000	CAP CER .1uF 20% 10V
C82	01A21000	CAP CER .1uF 20% 10V
C83	01A21000	CAP CER .1uF 20% 10V
C84	01A21000	CAP CER .1uF 20% 10V
C85	01A21000	CAP CER .1uF 20% 10V
C86	01A21000	CAP CER .1uF 20% 10V
C87	01A21000	CAP CER .1uF 20% 10V
C88	01E32200	CAP POLYCARB 2.2uF 10% 100V
C89	01D05000A	CAP POLYSTY 5000PF 2.5% 33V
C90	01B00430C	CAP MICA 430PF 5% 500V
C91	01B00062C	CAP MICA 62PF 5% 500V
C92	01D01100	CAP POLYSTY 1100PF 1% 33V
C93	01A21000	CAP CER .1uF 20% 10V
C94	01A21000	CAP CER .1uF 20% 10V
C95	01A21000	CAP CER .1uF 20% 10V
C96	01A21000	CAP CER .1uF 20% 10V
C97	01A21000	CAP CER .1uF 20% 10V
C98	01A21000	CAP CER .1uF 20% 10V
C99	01A21000	CAP CER .1uF 20% 10V
C100	01A21000	CAP CER .1uF 20% 10V
C101	01A21000	CAP CER .1uF 20% 10V
C102	01A21000	CAP CER .1uF 20% 10V
C103	01A21000	CAP CER .1uF 20% 10V
C104	01A21000	CAP CER .1uF 20% 10V
C105	01A21000	CAP CER .1uF 20% 10V
C106	01A21000	CAP CER .1uF 20% 10V
C107	01E24700	CAP POLYCARB .47uF 5% 100V
C108	01E13300	CAP POLYCARB .033uF 5% 250V
C110	01A11000	CAP CER .01uF 20% 50V
C111	01D02700	CAP POLYSTY 2700PF 1% 33V
C112	01A11000	CAP CER .01uF 20% 50V
D1	03A03064	DIODE SIGNAL 1N3064 75V

DOC NO:
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

PARTS LIST BY ASSEMBLY

DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
D2	03A03064	DIODE SIGNAL 1N3064 75V
D3	03A03064	DIODE SIGNAL 1N3064 75V
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03A03064	DIODE SIGNAL 1N3064 75V
D6	03A03064	DIODE SIGNAL 1N3064 75V
D7	03A03064	DIODE SIGNAL 1N3064 75V
D8	03A03064	DIODE SIGNAL 1N3064 75V
D9	03A03064	DIODE SIGNAL 1N3064 75V
D10	03A03064	DIODE SIGNAL 1N3064 75V
D11	03A03064	DIODE SIGNAL 1N3064 75V
D12	03A03064	DIODE SIGNAL 1N3064 75V
D13	03A03064	DIODE SIGNAL 1N3064 75V
D14	03A03064	DIODE SIGNAL 1N3064 75V
D15	03A03064	DIODE SIGNAL 1N3064 75V
D17	03A03064	DIODE SIGNAL 1N3064 75V
D18	03A03064	DIODE SIGNAL 1N3064 75V
D19	03A03064	DIODE SIGNAL 1N3064 75V
D20	03A03064	DIODE SIGNAL 1N3064 75V
IC1	08A00356	IC OP AMP 356
IC2	08B04558	IC OP AMP 4558
IC3	08B04558	IC OP AMP 4558
IC4	08B04558	IC OP AMP 4558
IC5	08A00356	IC OP AMP 356
IC6	08B04558	IC OP AMP 4558
IC7	08B04558	IC OP AMP 4558
IC8	08B04558	IC OP AMP 4558
IC9	08B04558	IC OP AMP 4558
IC10	08B04558	IC OP AMP 4558
IC11	08B04558	IC OP AMP 4558
IC12	08B04558	IC OP AMP 4558
IC13	08B04558	IC OP AMP 4558
IC14	08B04558	IC OP AMP 4558
IC15	08B04558	IC OP AMP 4558
IC16	08B04558	IC OP AMP 4558
IC17	08B04558	IC OP AMP 4558
IC18	08A00356	IC OP AMP 356
L2	15AD4700	INDUCTOR 470uH 10%
L3	15AD2700	INDUCTOR 270uH 10%
Q1	05E05639	TRANSISTOR JFET 2N5639
Q2	05E05639	TRANSISTOR JFET 2N5639
Q3	05E05639	TRANSISTOR JFET 2N5639
Q4	05E05639	TRANSISTOR JFET 2N5639
Q5	05C04401	TRANSISTOR NPN 2N4401
Q6	05C04401	TRANSISTOR NPN 2N4401
Q7	05A05138	TRANSISTOR PNP 2N5138
Q8	05A05138	TRANSISTOR PNP 2N5138
Q9	05A05138	TRANSISTOR PNP 2N5138
Q10	05E05639	TRANSISTOR JFET 2N5639
Q11	05E05639	TRANSISTOR JFET 2N5639
Q12	05E05639	TRANSISTOR JFET 2N5639
Q13	05E05639	TRANSISTOR JFET 2N5639
R1	12F11000	RES METAL FILM 10.0K 1% 1/4W
R2	12J11000	RES METAL FILM 10.00K .1% 1/10W
R3	12J11000	RES METAL FILM 10.00K .1% 1/10W

DOC NO:
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

PARTS LIST BY ASSEMBLY

DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R4	12B31000	RES CARBON 1.0M 5% 1/4W
R6	12J11000	RES METAL FILM 10.00K .1% 1/10W
R7	12J21000	RES METAL FILM 100.0K .1% 1/10W
R8	12J11000	RES METAL FILM 10.00K .1% 1/10W
R9	12J21000	RES METAL FILM 100.0K .1% 1/10W
R10	12J11000	RES METAL FILM 10.00K .1% 1/10W
R11	12J21000	RES METAL FILM 100.0K .1% 1/10W
R12	12J11000	RES METAL FILM 10.00K .1% 1/10W
R13	12F09530	RES METAL FILM 9.53K 1% 1/4W
R14	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R15	12B21000	RES CARBON 100K 5% 1/4W
R16	12B31000	RES CARBON 1.0M 5% 1/4W
R17	12B21000	RES CARBON 100K 5% 1/4W
R18	12B31000	RES CARBON 1.0M 5% 1/4W
R19	12F11000	RES METAL FILM 10.0K 1% 1/4W
R20	12F11000	RES METAL FILM 10.0K 1% 1/4W
R21	12F11000	RES METAL FILM 10.0K 1% 1/4W
R22	12J11000	RES METAL FILM 10.00K .1% 1/10W
R23	12B31000	RES CARBON 1.0M 5% 1/4W
R24	12B31000	RES CARBON 1.0M 5% 1/4W
R25	12B31000	RES CARBON 1.0M 5% 1/4W
R26	12F21000	RES METAL FILM 100K 1% 1/4W
R27	12F21000	RES METAL FILM 100K 1% 1/4W
R28	12F21000	RES METAL FILM 100K 1% 1/4W
R29	12F21000	RES METAL FILM 100K 1% 1/4W
R30	12J11000	RES METAL FILM 10.00K .1% 1/10W
R31	12B31000	RES CARBON 1.0M 5% 1/4W
R32	12F03830	RES METAL FILM 3.83K 1% 1/4W
R33	12F21000	RES METAL FILM 100K 1% 1/4W
R34	12F03830	RES METAL FILM 3.83K 1% 1/4W
R35	12F03830	RES METAL FILM 3.83K 1% 1/4W
R36	12F21000	RES METAL FILM 100K 1% 1/4W
R37	12F11000	RES METAL FILM 10.0K 1% 1/4W
R38	12F11780	RES METAL FILM 17.8K 1% 1/4W
R39	12B12000	RES CARBON 20K 5% 1/4W
R40	12B21000	RES CARBON 100K 5% 1/4W
R41	12B12000	RES CARBON 20K 5% 1/4W
R42	12B21000	RES CARBON 100K 5% 1/4W
R43	12B12000	RES CARBON 20K 5% 1/4W
R44	12B21000	RES CARBON 100K 5% 1/4W
R45	12B12000	RES CARBON 20K 5% 1/4W
R46	12B31000	RES CARBON 1.0M 5% 1/4W
R47	12F07500	RES METAL FILM 7.50K 1% 1/4W
R48	12F07500	RES METAL FILM 7.50K 1% 1/4W
R49	12B13000	RES CARBON 30K 5% 1/4W
R50	12B13000	RES CARBON 30K 5% 1/4W
R51	12B21000	RES CARBON 100K 5% 1/4W
R52	12B21000	RES CARBON 100K 5% 1/4W
R53	12B21000	RES CARBON 100K 5% 1/4W
R54	12B21000	RES CARBON 100K 5% 1/4W
R55	12J11259	RES METAL FILM 12.59K .1% 1/10W
R56	12F01500	RES METAL FILM 1.50K 1% 1/4W
R57	12F01500	RES METAL FILM 1.50K 1% 1/4W
R58	12J11259	RES METAL FILM 12.59K .1% 1/10W

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DESCRIPTION: 100 BD ASSY

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DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R59	12J11259	RES METAL FILM 12.59K .1% 1/10W
R60	12F12490	RES METAL FILM 24.9K 1% 1/4W
R61	12F12150	RES METAL FILM 21.5K 1% 1/4W
R62	12F11000	RES METAL FILM 10.0K 1% 1/4W
R65	12F08250	RES METAL FILM 8.25K 1% 1/4W
R66	12F08250	RES METAL FILM 8.25K 1% 1/4W
R67	12F08250	RES METAL FILM 8.25K 1% 1/4W
R68	12F11000	RES METAL FILM 10.0K 1% 1/4W
R69	12F11000	RES METAL FILM 10.0K 1% 1/4W
R70	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R71	12F06650	RES METAL FILM 6.65K 1% 1/4W
R72	12J16252	RES METAL FILM 62.52K .1% 1/10W
R73	12J06033	RES METAL FILM 6.033K .1% 1/10W
R74	12J11000	RES METAL FILM 10.00K .1% 1/10W
R75	12J02589	RES METAL FILM 2.589K .1% 1/10W
R76	12J23128	RES METAL FILM 312.8K .1% 1/10W
R84	12F07680	RES METAL FILM 7.68K 1% 1/4W
R85	12F13920	RES METAL FILM 39.2K 1% 1/4W
R86	12F11370	RES METAL FILM 13.7K 1% 1/4W
R87	12F04990	RES METAL FILM 4.99K 1% 1/4W
R89	12F04990	RES METAL FILM 4.99K 1% 1/4W
R90	12F04990	RES METAL FILM 4.99K 1% 1/4W
R91	12F16040	RES METAL FILM 60.4K 1% 1/4W
R92	12F03830	RES METAL FILM 3.83K 1% 1/4W
R93	13A02000	RES METAL FILM 2K 10% .5W 1 TURN
R94	12F07870	RES METAL FILM 7.87K 1% 1/4W
R95	12F07870	RES METAL FILM 7.87K 1% 1/4W
R96	12F13240	RES METAL FILM 32.4K 1% 1/4W
R97	12F13240	RES METAL FILM 32.4K 1% 1/4W
R98	12F13240	RES METAL FILM 32.4K 1% 1/4W
R99	12F11270	RES METAL FILM 12.7K 1% 1/4W
R100	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R101	12F11000	RES METAL FILM 10.0K 1% 1/4W
R102	12FD2000	RES METAL FILM 200 OHM 1% 1/4W
R103	12FD9090	RES METAL FILM 909 OHM 1% 1/4W
R104	12FD5900	RES METAL FILM 590 OHM 1% 1/4W
R105	12F11270	RES METAL FILM 12.7K 1% 1/4W
R106	12F11740	RES METAL FILM 17.4K 1% 1/4W
R107	12F11000	RES METAL FILM 10.0K 1% 1/4W
R108	12F23010	RES METAL FILM 301K 1% 1/4W
R109	12F11270	RES METAL FILM 12.7K 1% 1/4W
R110	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R111	12F09090	RES METAL FILM 9.09K 1% 1/4W
R112	12F09530	RES METAL FILM 9.53K 1% 1/4W
R113	12F06040	RES METAL FILM 6.04K 1% 1/4W
R114	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R115	12F02870	RES METAL FILM 2.87K 1% 1/4W
R116	12F02870	RES METAL FILM 2.87K 1% 1/4W
R117	12F11370	RES METAL FILM 13.7K 1% 1/4W
R118	12F15360	RES METAL FILM 53.6K 1% 1/4W
R119	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R120	12F03650	RES METAL FILM 3.65K 1% 1/4W
R121	12F11020	RES METAL FILM 10.2K 1% 1/4W
R122	12F01540	RES METAL FILM 1.54K 1% 1/4W

DOC NO:
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R123	12F11430	RES METAL FILM 14.3K 1% 1/4W
R124	12F05360	RES METAL FILM 5.36K 1% 1/4W
R125	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R126	12F04870	RES METAL FILM 4.87K 1% 1/4W
R127	12F03650	RES METAL FILM 3.65K 1% 1/4W
R128	12F05760	RES METAL FILM 5.76K 1% 1/4W
R129	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R130	12F03240	RES METAL FILM 3.24K 1% 1/4W
R131	12F04320	RES METAL FILM 4.32K 1% 1/4W
R132	12F11180	RES METAL FILM 11.8K 1% 1/4W
R133	12F21180	RES METAL FILM 118K 1% 1/4W
R134	12F11870	RES METAL FILM 18.7K 1% 1/4W
R135	12F11780	RES METAL FILM 17.8K 1% 1/4W
R136	13A02000A1	RES METAL FILM 2K 10% .75W 15 TURN
R137	12F02940	RES METAL FILM 2.94K 1% 1/4W
R138	12F01870	RES METAL FILM 1.87K 1% 1/4W
R139	12F08660	RES METAL FILM 8.66K 1% 1/4W
R140	12F11870	RES METAL FILM 18.7K 1% 1/4W
R141	12F11780	RES METAL FILM 17.8K 1% 1/4W
R142	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R143	12F08660	RES METAL FILM 8.66K 1% 1/4W
R144	12F11870	RES METAL FILM 18.7K 1% 1/4W
R145	12F11780	RES METAL FILM 17.8K 1% 1/4W
R146	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R147	12F03010	RES METAL FILM 3.01K 1% 1/4W
R148	12F01000	RES METAL FILM 1.00K 1% 1/4W
R149	12F12430	RES METAL FILM 24.3K 1% 1/4W
R150	12F11870	RES METAL FILM 18.7K 1% 1/4W
R151	12F11780	RES METAL FILM 17.8K 1% 1/4W
R152	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R153	12F11130	RES METAL FILM 11.3K 1% 1/4W
R154	12F11130	RES METAL FILM 11.3K 1% 1/4W
R155	12F11130	RES METAL FILM 11.3K 1% 1/4W
R156	12B04300	RES CARBON 4.3K 5% 1/4W
R157	12B03600	RES CARBON 3.6K 5% 1/4W
SW1-10	F42-050A	B SWITCH ASSEMBLY SPEC CONTROL DWG
T1	16A00022	TRANSFORMER SIGNAL 10K:10K .04-20KHZ
X2	20A00003	SOCKET IC 8 PIN
X3	20A00003	SOCKET IC 8 PIN
X4	20A00003	SOCKET IC 8 PIN
X17	20A00003	SOCKET IC 8 PIN
1	19L00034	CONN 18 CONTACT
10	21Z00004	SWITCH CAP GRAY/GREEN/CLEAR
1	23H00012	MU-METAL CAN
4	23Z00020	INSULATOR GLASS BEAD
1	F-HLI-050	B CAPACITOR SPACER
1	F42-101-102	B P.C. D&T SHIELD BOARD
1	F42-102G-1	C PC D&T INPUT/FILTER
REF	D42-103D-1	COMPONENT LAYOUT
REF	R42-104J-1	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO:
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01G36800	CAP TANT ELEC 6.8uF 10% 15V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G36800	CAP TANT ELEC 6.8uF 10% 15V
C7	01A21000	CAP CER .1uF 20% 10V
C8	01A00030	CAP CER 30PF 5% 1KV
C9	01A21000	CAP CER .1uF 20% 10V
C10	01D14700	CAP POLYSTY .047uF 1% 33V
C11	01A21000	CAP CER .1uF 20% 10V
C12	01G42200	CAP TANT ELEC 22uF 10% 15V
C13	01G42200	CAP TANT ELEC 22uF 10% 15V
C14	01G42200	CAP TANT ELEC 22uF 10% 15V
C15	01A11000	CAP CER .01uF 20% 50V
C16	01A00030	CAP CER 30PF 5% 1KV
C17	01A11000	CAP CER .01uF 20% 50V
C18	01A11000	CAP CER .01uF 20% 50V
C19	01A11000	CAP CER .01uF 20% 50V
C20	01A11000	CAP CER .01uF 20% 50V
C21	01A11000	CAP CER .01uF 20% 50V
C22	01A11000	CAP CER .01uF 20% 50V
C23	01A11000	CAP CER .01uF 20% 50V
C24	01A11000	CAP CER .01uF 20% 50V
C25	01A11000	CAP CER .01uF 20% 50V
C26	01A11000	CAP CER .01uF 20% 50V
C27	01A11000	CAP CER .01uF 20% 50V
C28	01A11000	CAP CER .01uF 20% 50V
C29	01A11000	CAP CER .01uF 20% 50V
C30	01A11000	CAP CER .01uF 20% 50V
C31	01A11000	CAP CER .01uF 20% 50V
C32	01A11000	CAP CER .01uF 20% 50V
C33	01A11000	CAP CER .01uF 20% 50V
C34	01A11000	CAP CER .01uF 20% 50V
C35	01A11000	CAP CER .01uF 20% 50V
C36	01A11000	CAP CER .01uF 20% 50V
C37	01A11000	CAP CER .01uF 20% 50V
C38	01A21000	CAP CER .1uF 20% 10V
C39	01A21000	CAP CER .1uF 20% 10V
C40	01A21000	CAP CER .1uF 20% 10V
C41	01A21000	CAP CER .1uF 20% 10V
C42	01A11000	CAP CER .01uF 20% 50V
C43	01A11000	CAP CER .01uF 20% 50V
C44	01A11000	CAP CER .01uF 20% 50V
C45	01A11000	CAP CER .01uF 20% 50V
D1	03A03064	DIODE SIGNAL 1N3064 75V
D2	03A03064	DIODE SIGNAL 1N3064 75V
D3	03A03064	DIODE SIGNAL 1N3064 75V
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03C00823A	DIODE ZENER 1N823A 6.2V 5%
D6	03C05729B	DIODE ZENER 1N5729B 5.1V 5%
D7	03A03064	DIODE SIGNAL 1N3064 75V
D8	03A03064	DIODE SIGNAL 1N3064 75V
D9	03A03064	DIODE SIGNAL 1N3064 75V
D10	03A03064	DIODE SIGNAL 1N3064 75V
D11	03A03064	DIODE SIGNAL 1N3064 75V
D12	03A03064	DIODE SIGNAL 1N3064 75V

DOC NO:
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
D13	03A03064	DIODE SIGNAL 1N3064 75V
D14	03A03064	DIODE SIGNAL 1N3064 75V
FC1	19H00006	CABLE FLAT 18 CONTACT 4 IN
IC1	07G04069	IC CMOS 4069UB
IC2	07G04013	IC CMOS 4013B
IC3	07G04011	IC CMOS 4011B
IC4	07G04002	IC CMOS 4002B
IC5	07G04511	IC CMOS 4511B
IC6	07G04511	IC CMOS 4511B
IC7	07G04511	IC CMOS 4511B
IC8	07G04511	IC CMOS 4511B
IC9	07G04011	IC CMOS 4011B
IC10	07G04510	IC CMOS 4510B
IC11	07G04510	IC CMOS 4510B
IC12	07G04510	IC CMOS 4510B
IC13	07G04013	IC CMOS 4013B
IC14	07G04070	IC CMOS 4070B
IC15	07G04001	IC CMOS 4001B
IC16	07G04069	IC CMOS 4069UB
IC17	07G04011	IC CMOS 4011B
IC18	07G04013	IC CMOS 4013B
IC19	07G04023	IC CMOS 4023B
IC20	07G04520	IC CMOS 4520B
IC21	07G14501	IC CMOS 14501UB
IC22	07G04013	IC CMOS 4013B
IC23	07G04001	IC CMOS 4001B
IC24	08B04558	IC OP AMP 4558
IC26	08A00356	IC OP AMP 356
IC27	08A00356	IC OP AMP 356
IC28	08B04558	IC OP AMP 4558
IC29	07G04066	IC CMOS 4066B
IC30	08B04558	IC OP AMP 4558
IC31	07G04066	IC CMOS 4066B
IC32	08A00356	IC OP AMP 356
Q1	05C04401	TRANSISTOR NPN 2N4401
Q2	05C04401	TRANSISTOR NPN 2N4401
Q3	05C04401	TRANSISTOR NPN 2N4401
Q4	05C04401	TRANSISTOR NPN 2N4401
Q5	05C04401	TRANSISTOR NPN 2N4401
R1	12F12000	RES METAL FILM 20.0K 1% 1/4W
R2	12F02430	RES METAL FILM 2.43K 1% 1/4W
R3	12F15490	RES METAL FILM 54.9K 1% 1/4W
R4	12F11000	RES METAL FILM 10.0K 1% 1/4W
R5	12F21500	RES METAL FILM 150K 1% 1/4W
R6	13A21000A	RES METAL FILM 100K 10% .5W 1 TURN
R7	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R10	12B13000	RES CARBON 30K 5% 1/4W
R11	12F12000	RES METAL FILM 20.0K 1% 1/4W
R12	12F12000	RES METAL FILM 20.0K 1% 1/4W
R13	12F11000	RES METAL FILM 10.0K 1% 1/4W
R14	12F12000	RES METAL FILM 20.0K 1% 1/4W
R15	12F05110	RES METAL FILM 5.11K 1% 1/4W
R16	12F02430	RES METAL FILM 2.43K 1% 1/4W
R17	12F12000	RES METAL FILM 20.0K 1% 1/4W

DOC NO:
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R18	12F13010	RES METAL FILM 30.1K 1% 1/4W
R19	12F12000	RES METAL FILM 20.0K 1% 1/4W
R20	12F12000	RES METAL FILM 20.0K 1% 1/4W
R21	13A21000A	RES METAL FILM 100K 10% .5W 1 TURN
R22	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R23	12F13010	RES METAL FILM 30.1K 1% 1/4W
R24	12F13010	RES METAL FILM 30.1K 1% 1/4W
R25	12F13010	RES METAL FILM 30.1K 1% 1/4W
R26	12F17870	RES METAL FILM 78.7K 1% 1/4W
R27	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R28	12F02000	RES METAL FILM 2.00K 1% 1/4W
R29	12FD3740	RES METAL FILM 374 OHM 1% 1/4W
R30	12B41000	RES CARBON 10M 5% 1/4W
R31	12F21740	RES METAL FILM 174K 1% 1/4W
R32	13A12000A	RES METAL FILM 20K 10% .5W 1 TURN
R33	12B13000	RES CARBON 30K 5% 1/4W
R34	12B13000	RES CARBON 30K 5% 1/4W
R35	12B21000	RES CARBON 100K 5% 1/4W
R36	12B21000	RES CARBON 100K 5% 1/4W
R37	12FD2610	RES METAL FILM 261 OHM 1% 1/4W
R38	12B21000	RES CARBON 100K 5% 1/4W
R39	12B11000	RES CARBON 10K 5% 1/4W
R40	12B11000	RES CARBON 10K 5% 1/4W
R41	12B21000	RES CARBON 100K 5% 1/4W
R42	12B21000	RES CARBON 100K 5% 1/4W
R43	12B21000	RES CARBON 100K 5% 1/4W
R44	12B13000	RES CARBON 30K 5% 1/4W
R45	12B13300	RES CARBON 33K 5% 1/4W
R46	12F07150	RES METAL FILM 7.15K 1% 1/4W
R47	12B21000	RES CARBON 100K 5% 1/4W
R48	12F03010	RES METAL FILM 3.01K 1% 1/4W
R49	12F21370	RES METAL FILM 137K 1% 1/4W
R50	12F11000	RES METAL FILM 10.0K 1% 1/4W
R51	12B11000	RES CARBON 10K 5% 1/4W
R52	12F13480	RES METAL FILM 34.8K 1% 1/4W
R53	12B11000	RES CARBON 10K 5% 1/4W
R54	12F01000	RES METAL FILM 1.00K 1% 1/4W
R55	12F25110	RES METAL FILM 511K 1% 1/4W
R56	12B11000	RES CARBON 10K 5% 1/4W
R57	12F21000	RES METAL FILM 100K 1% 1/4W
R58	12B11000	RES CARBON 10K 5% 1/4W
R59	12B11000	RES CARBON 10K 5% 1/4W
R60	12BD2700	RES CARBON 270 OHM 5% 1/4W
R61	12B11000	RES CARBON 10K 5% 1/4W
R62	12BD2700	RES CARBON 270 OHM 5% 1/4W
R63	12B11000	RES CARBON 10K 5% 1/4W
R64	12BD1300	RES CARBON 130 OHM 5% 1/4W
R65	12B21000	RES CARBON 100K 5% 1/4W
R66	12BD2700	RES CARBON 270 OHM 5% 1/4W
R67	12BD2700	RES CARBON 270 OHM 5% 1/4W
R68	12BD2700	RES CARBON 270 OHM 5% 1/4W
R69	12BD2700	RES CARBON 270 OHM 5% 1/4W
R70	12BD2700	RES CARBON 270 OHM 5% 1/4W
R71	12BD2700	RES CARBON 270 OHM 5% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R72	12BD2700	RES CARBON 270 OHM 5% 1/4W
R73	12B21000	RES CARBON 100K 5% 1/4W
R74	12BD2700	RES CARBON 270 OHM 5% 1/4W
R75	12BD2700	RES CARBON 270 OHM 5% 1/4W
R76	12BD2700	RES CARBON 270 OHM 5% 1/4W
R77	12BD2700	RES CARBON 270 OHM 5% 1/4W
R78	12BD2700	RES CARBON 270 OHM 5% 1/4W
R79	12BD2700	RES CARBON 270 OHM 5% 1/4W
R80	12BD2700	RES CARBON 270 OHM 5% 1/4W
R81	12BD2700	RES CARBON 270 OHM 5% 1/4W
R82	12BD2700	RES CARBON 270 OHM 5% 1/4W
R83	12BD2700	RES CARBON 270 OHM 5% 1/4W
R84	12BD2700	RES CARBON 270 OHM 5% 1/4W
R85	12BD2700	RES CARBON 270 OHM 5% 1/4W
R86	12BD2700	RES CARBON 270 OHM 5% 1/4W
R87	12BD2700	RES CARBON 270 OHM 5% 1/4W
R88	12B21000	RES CARBON 100K 5% 1/4W
R89	12BC1000	RES CARBON 10 OHM 5% 1/4W
R90	12B21000	RES CARBON 100K 5% 1/4W
R91	12B21000	RES CARBON 100K 5% 1/4W
R92	12B13000	RES CARBON 30K 5% 1/4W
1	F42-101-102	B P.C. D&T SHIELD BOARD
1	F42-202C-2	C PC D&T DVM
SUB	D4210A-1-2-1	DISPLAY BD ASSY
REF	D42-203C	COMPONENT LAYOUT
REF	R42-204D	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-2-1
DESCRIPTION: DISPLAY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
3	11B00003	DISPLAY LED MAN4640
1	11C00002	DISPLAY LED MAN4605
1	19K00001	CONN PC BOARD 36 CONTACT
4	20A00004	SOCKET IC 14 PIN
1	F42-201-102A	B P.C. D&T DISPLAY
REF	B42-201-103B	COMPONENT LAYOUT
REF	B42-201-104	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2
DESCRIPTION: MECHANICAL ASSY FOR 300/400 BD

REF DES./QTY	STOCK NO.	DESCRIPTION
5	23A00030	SPACER 1/4 OD X 1 4-40 AL
2	23A00031	SPACER 1/4 OD X 1/8 #4 AL
11	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
11	24A04102	WASHER FLAT #4 SCP
11	24A04104	WASHER EXT TOOTH #4
1	24A04204	NUT HEX 4 - 40 SNP
SUB	D4210A-2-1	300 BD ASSY
SUB	D4210A-2-2	400 BD ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-1
DESCRIPTION: 300 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01G42200	CAP TANT ELEC 22uF 10% 15V
C3	01G42200	CAP TANT ELEC 22uF 10% 15V
C4	01G42200	CAP TANT ELEC 22uF 10% 15V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G42200	CAP TANT ELEC 22uF 10% 15V
C7	01G42200	CAP TANT ELEC 22uF 10% 15V
C8	01E24700	CAP POLYCARB .47uF 5% 100V
C9	01E24700	CAP POLYCARB .47uF 5% 100V
C10	01B00200C	CAP MICA 200PF 5% 500V
C11	01A04700	CAP CER 4700PF 10% 250V
C12	01B00033C	CAP MICA 33PF 5% 500V
C13	01B00120C	CAP MICA 120PF 5% 500V
C14	01A00047	CAP CER 47PF 20% 1KV
C15	01A00047	CAP CER 47PF 20% 1KV
C16	01A00047	CAP CER 47PF 20% 1KV
C17	01A00047	CAP CER 47PF 20% 1KV
C18	01A11000	CAP CER .01uF 20% 50V
C19	01A11000	CAP CER .01uF 20% 50V
C20	01A11000	CAP CER .01uF 20% 50V
C21	01A11000	CAP CER .01uF 20% 50V
C22	01A11000	CAP CER .01uF 20% 50V
C23	01A11000	CAP CER .01uF 20% 50V
C24	01A11000	CAP CER .01uF 20% 50V
C25	01A11000	CAP CER .01uF 20% 50V
C26	01A11000	CAP CER .01uF 20% 50V
C27	01A21000	CAP CER .1uF 20% 10V
C28	01A21000	CAP CER .1uF 20% 10V
C29	01A11000	CAP CER .01uF 20% 50V
C30	01A11000	CAP CER .01uF 20% 50V
C31	01A11000	CAP CER .01uF 20% 50V
C32	01A11000	CAP CER .01uF 20% 50V
C33	01A11000	CAP CER .01uF 20% 50V
C34	01A11000	CAP CER .01uF 20% 50V
C35	01A00047	CAP CER 47PF 20% 1KV
D1	03A03064	DIODE SIGNAL 1N3064 75V
D2	03A03064	DIODE SIGNAL 1N3064 75V
D3	03A03064	DIODE SIGNAL 1N3064 75V
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03A03064	DIODE SIGNAL 1N3064 75V
D6	03A03064	DIODE SIGNAL 1N3064 75V
D7	03A03064	DIODE SIGNAL 1N3064 75V
D8	03A03064	DIODE SIGNAL 1N3064 75V
D9	03A03064	DIODE SIGNAL 1N3064 75V
D10	03A03064	DIODE SIGNAL 1N3064 75V
D11	03A03064	DIODE SIGNAL 1N3064 75V
D12	03A03064	DIODE SIGNAL 1N3064 75V
D13	03A03064	DIODE SIGNAL 1N3064 75V
FC1	19H00006	CABLE FLAT 18 CONTACT 4 IN
IC1	07G04012	IC CMOS 4012B
IC2	07G04011	IC CMOS 4011B
IC3	07G04020	IC CMOS 4020B
IC4	07G04518	IC CMOS 4518B
IC5	07G04011	IC CMOS 4011B
IC6	07G04518	IC CMOS 4518B

DOC NO:
ASSEMBLY NO: D4210A-2-1
DESCRIPTION: 300 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
IC7	07G04046	IC CMOS 4046B
IC8	08A00356	IC OP AMP 356
IC9	08A00356	IC OP AMP 356
IC10	07G04013	IC CMOS 4013B
IC11	07G04518	IC CMOS 4518B
IC12	07G04518	IC CMOS 4518B
IC13	07G04011	IC CMOS 4011B
IC14	07G04046	IC CMOS 4046B
IC15	07G04013	IC CMOS 4013B
IC16	07G04011	IC CMOS 4011B
IC17	07G04011	IC CMOS 4011B
IC18	07G04011	IC CMOS 4011B
IC19	07G04011	IC CMOS 4011B
IC20	07K05005	IC PMOS 5005
IC21	07G04013	IC CMOS 4013B
J2	19K00001	CONN PC BOARD 36 CONTACT
Q1	05D00007	TRANSISTOR NPN MPS-A14
Q2	05D00007	TRANSISTOR NPN MPS-A14
Q3	05D00007	TRANSISTOR NPN MPS-A14
Q4	05D00007	TRANSISTOR NPN MPS-A14
Q5	05C04401	TRANSISTOR NPN 2N4401
Q6	05C04401	TRANSISTOR NPN 2N4401
Q7	05C04401	TRANSISTOR NPN 2N4401
Q8	05C04401	TRANSISTOR NPN 2N4401
Q9	05C04401	TRANSISTOR NPN 2N4401
Q10	05C04401	TRANSISTOR NPN 2N4401
Q11	05C04401	TRANSISTOR NPN 2N4401
Q12	05C04401	TRANSISTOR NPN 2N4401
Q13	05C04401	TRANSISTOR NPN 2N4401
R1	12B06200	RES CARBON 6.2K 5% 1/4W
R2	12B21600	RES CARBON 160K 5% 1/4W
R3	12B21000	RES CARBON 100K 5% 1/4W
R4	12B04300	RES CARBON 4.3K 5% 1/4W
R5	12BD5100	RES CARBON 510 OHM 5% 1/4W
R6	12B31000	RES CARBON 1.0M 5% 1/4W
R7	12B23300	RES CARBON 330K 5% 1/4W
R8	12B21000	RES CARBON 100K 5% 1/4W
R9	12B25600	RES CARBON 560K 5% 1/4W
R10	12B11100	RES CARBON 11K 5% 1/4W
R11	12B11000	RES CARBON 10K 5% 1/4W
R12	12B21000	RES CARBON 100K 5% 1/4W
R13	12B21000	RES CARBON 100K 5% 1/4W
R14	12B21000	RES CARBON 100K 5% 1/4W
R15	12B41000	RES CARBON 10M 5% 1/4W
R16	12B02000	RES CARBON 2K 5% 1/4W
R17	12B21000	RES CARBON 100K 5% 1/4W
R18	12B11000	RES CARBON 10K 5% 1/4W
R19	12B13000	RES CARBON 30K 5% 1/4W
R20	12B21000	RES CARBON 100K 5% 1/4W
R21	12B21000	RES CARBON 100K 5% 1/4W
R22	12B21000	RES CARBON 100K 5% 1/4W
R23	12B21000	RES CARBON 100K 5% 1/4W
R24	12B16800	RES CARBON 68K 5% 1/4W
R25	12B16800	RES CARBON 68K 5% 1/4W

DOC NO:
ASSEMBLY NO: D4210A-2-1
DESCRIPTION: 300 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R26	12B04700	RES CARBON 4.7K 5% 1/4W
R27	12B21000	RES CARBON 100K 5% 1/4W
R28	12B11000	RES CARBON 10K 5% 1/4W
R29	12B11200	RES CARBON 12K 5% 1/4W
R30	12B11200	RES CARBON 12K 5% 1/4W
R31	12B12000	RES CARBON 20K 5% 1/4W
R32	12B12000	RES CARBON 20K 5% 1/4W
R33	12B12000	RES CARBON 20K 5% 1/4W
R34	12B12000	RES CARBON 20K 5% 1/4W
R35	12B01800	RES CARBON 1.8K 5% 1/4W
R36	12B01800	RES CARBON 1.8K 5% 1/4W
R37	12B01800	RES CARBON 1.8K 5% 1/4W
R38	12B01800	RES CARBON 1.8K 5% 1/4W
R39	12B01800	RES CARBON 1.8K 5% 1/4W
R40	12B01800	RES CARBON 1.8K 5% 1/4W
R41	12B01800	RES CARBON 1.8K 5% 1/4W
R42	12BC6200	RES CARBON 62 OHM 5% 1/4W
R43	12BC6200	RES CARBON 62 OHM 5% 1/4W
R44	12BC6200	RES CARBON 62 OHM 5% 1/4W
R45	12BC6200	RES CARBON 62 OHM 5% 1/4W
R46	12BC6200	RES CARBON 62 OHM 5% 1/4W
R47	12BC6200	RES CARBON 62 OHM 5% 1/4W
R48	12BC6200	RES CARBON 62 OHM 5% 1/4W
R49	12BC6200	RES CARBON 62 OHM 5% 1/4W
R50	12BC6200	RES CARBON 62 OHM 5% 1/4W
R51	12B11000	RES CARBON 10K 5% 1/4W
R52	12B19100	RES CARBON 91K 5% 1/4W
R53	12B19100	RES CARBON 91K 5% 1/4W
R54	12B05100	RES CARBON 5.1K 5% 1/4W
R55	12B05100	RES CARBON 5.1K 5% 1/4W
R56	12B21000	RES CARBON 100K 5% 1/4W
R57	12B16200	RES CARBON 62K 5% 1/4W
XTAL1	25A00005	CRYSTAL 2.0MHZ 32 PF
2	20A00005	SOCKET IC 16 PIN
1	F42-302D-2	C PC D&T COUNTER
SUB	D4210A-2-1-1	DISPLAY BD ASSY
REF	D42-303B	COMPONENT LAYOUT
REF	R42-304F	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO:
ASSEMBLY NO: D4210A-2-1-1
DESCRIPTION: DISPLAY BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
4	11B00003	DISPLAY LED MAN4640
4	20A00004	SOCKET IC 14 PIN
1	F42-301-102A	B PC D&T DISPLAY
REF	B42-301-103	COMPONENT LAYOUT
		------ END OF FILE -----

DOC NO:
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01A21000	CAP CER .1uF 20% 10V
C2	01A21000	CAP CER .1uF 20% 10V
C3	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C4	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G42200	CAP TANT ELEC 22uF 10% 15V
C7	01G42200	CAP TANT ELEC 22uF 10% 15V
C8	01B00068C	CAP MICA 68PF 5% 500V
C9	01B00018C	CAP MICA 18PF 5% 500V
C10	01F24700A	CAP POLYEST .47uF 5% 250V
C11	01B00047C	CAP MICA 47PF 5% 500V
C13	01A21000	CAP CER .1uF 20% 10V
C14	01D12200	CAP POLYSTY .022uF 1% 33V
C15	01G42200	CAP TANT ELEC 22uF 10% 15V
C16	01E24700	CAP POLYCARB .47uF 5% 100V
C17	01E24700	CAP POLYCARB .47uF 5% 100V
C18	01A11000	CAP CER .01uF 20% 50V
C19	01G42200	CAP TANT ELEC 22uF 10% 15V
C20	01G42200	CAP TANT ELEC 22uF 10% 15V
C21	01D04700	CAP POLYSTY 4700PF 1% 33V
C22	01D11200	CAP POLYSTY .012uF 1% 33V
C23	01D00680	CAP POLYSTY 680PF 1% 33V
C24	01D14700	CAP POLYSTY .047uF 1% 33V
C25	01D01000	CAP POLYSTY 1000PF 1% 33V
C26	01D14700	CAP POLYSTY .047uF 1% 33V
C27	01D01000	CAP POLYSTY 1000PF 1% 33V
C28	01A21000A	CAP CER .1uF 20% 20V
C29	01B00100C1	CAP MICA 100PF 5% 500V
C30	01D01000	CAP POLYSTY 1000PF 1% 33V
C31	01D14700	CAP POLYSTY .047uF 1% 33V
C32	01B00047C	CAP MICA 47PF 5% 500V
C33	01H52200A	CAP AL ELEC 220uF -10 +50% 25V
C34	01D00750	CAP POLYSTY 750PF 1% 33V
C35	01H51000A	CAP AL ELEC 100uF 100V
C36	01H51000A	CAP AL ELEC 100uF 100V
C37	01A11000	CAP CER .01uF 20% 50V
C38	01A11000	CAP CER .01uF 20% 50V
C39	01G42200	CAP TANT ELEC 22uF 10% 15V
C40	01A11000	CAP CER .01uF 20% 50V
C41	01A11000	CAP CER .01uF 20% 50V
C42	01A11000	CAP CER .01uF 20% 50V
C43	01A11000	CAP CER .01uF 20% 50V
C44	01A11000	CAP CER .01uF 20% 50V
C45	01A11000	CAP CER .01uF 20% 50V
C46	01A11000	CAP CER .01uF 20% 50V
C47	01A11000	CAP CER .01uF 20% 50V
C48	01A21000	CAP CER .1uF 20% 10V
C49	01A11000	CAP CER .01uF 20% 50V
C50	01A11000	CAP CER .01uF 20% 50V
C51	01A11000	CAP CER .01uF 20% 50V
C52	01A21000	CAP CER .1uF 20% 10V
C53	01A11000	CAP CER .01uF 20% 50V
C54	01A11000	CAP CER .01uF 20% 50V
C55	01A11000	CAP CER .01uF 20% 50V

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C56	01A21000	CAP CER .1uF 20% 10V
C57	01A21000	CAP CER .1uF 20% 10V
C58	01G42200	CAP TANT ELEC 22uF 10% 15V
C61	01D06800	CAP POLYSTY 6800PF 1% 33V
C62	01D0390A	CAP POLYSTY 390PF 2.5% 33V
D1	03A03064	DIODE SIGNAL 1N3064 75V
D2	03C00823A	DIODE ZENER 1N823A 6.2V 5%
IC1	08B04558	IC OP AMP 4558
IC2	07G04066	IC CMOS 4066B
IC3	07G04046	IC CMOS 4046B
IC4	07G04013	IC CMOS 4013B
IC5	07G04066	IC CMOS 4066B
IC6	08B04558	IC OP AMP 4558
IC7	07G04011	IC CMOS 4011B
IC8	07G04510	IC CMOS 4510B
IC9	07G04028	IC CMOS 4028B
IC10	08B04558	IC OP AMP 4558
IC11	07G04066	IC CMOS 4066B
IC12	07G04066	IC CMOS 4066B
IC13	07G04066	IC CMOS 4066B
IC14	08B04558	IC OP AMP 4558
IC15	08B04558	IC OP AMP 4558
IC17	08B04558	IC OP AMP 4558
IC18	08B04558	IC OP AMP 4558
IC19	08B04558	IC OP AMP 4558
IC20	08A00356	IC OP AMP 356
IC21	08A00356	IC OP AMP 356
IC22	08B04558	IC OP AMP 4558
J1	19H00006	CABLE FLAT 18 CONTACT 4 IN
Q1	05C04401	TRANSISTOR NPN 2N4401
Q2	05A04403	TRANSISTOR PNP 2N4403
Q3	05D00008	TRANSISTOR NPN MPS-A18
R1	12BD1300	RES CARBON 130 OHM 5% 1/4W
R2	12B11200	RES CARBON 12K 5% 1/4W
R3	12B15100	RES CARBON 51K 5% 1/4W
R4	12BD1300	RES CARBON 130 OHM 5% 1/4W
R5	12B01100	RES CARBON 1.1K 5% 1/4W
R6	12B11200	RES CARBON 12K 5% 1/4W
R7	12F11500	RES METAL FILM 15.0K 1% 1/4W
R8	12B21000	RES CARBON 100K 5% 1/4W
R9	12B11000	RES CARBON 10K 5% 1/4W
R10	12F13090	RES METAL FILM 30.9K 1% 1/4W
R11	12B11500	RES CARBON 15K 5% 1/4W
R12	12B11200	RES CARBON 12K 5% 1/4W
R13	12F12490	RES METAL FILM 24.9K 1% 1/4W
R14	12BD5100	RES CARBON 510 OHM 5% 1/4W
R15	12F18060	RES METAL FILM 80.6K 1% 1/4W
R16	12F12740	RES METAL FILM 27.4K 1% 1/4W
R17	12F12740	RES METAL FILM 27.4K 1% 1/4W
R18	12F18060	RES METAL FILM 80.6K 1% 1/4W
R19	12F12740	RES METAL FILM 27.4K 1% 1/4W
R20	12F12740	RES METAL FILM 27.4K 1% 1/4W
R21	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R22	12F13650	RES METAL FILM 36.5K 1% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R23	12F11780	RES METAL FILM 17.8K 1% 1/4W
R24	12FD2740	RES METAL FILM 274 OHM 1% 1/4W
R25	12F13010	RES METAL FILM 30.1K 1% 1/4W
R26	12F05110	RES METAL FILM 5.11K 1% 1/4W
R27	12F12000	RES METAL FILM 20.0K 1% 1/4W
R28	12B14700	RES CARBON 47K 5% 1/4W
R29	12F11000	RES METAL FILM 10.0K 1% 1/4W
R30	12F13320	RES METAL FILM 33.2K 1% 1/4W
R31	12F15110	RES METAL FILM 51.1K 1% 1/4W
R32	12F01000	RES METAL FILM 1.00K 1% 1/4W
R33	12F11650	RES METAL FILM 16.5K 1% 1/4W
R34	12F15110	RES METAL FILM 51.1K 1% 1/4W
R35	12F12000	RES METAL FILM 20.0K 1% 1/4W
R36	12F21000	RES METAL FILM 100K 1% 1/4W
R37	12F21000	RES METAL FILM 100K 1% 1/4W
R38	12F11000	RES METAL FILM 10.0K 1% 1/4W
R39	12B32400	RES CARBON 2.4M 5% 1/4W
R40	12B32400	RES CARBON 2.4M 5% 1/4W
R41	12F26340	RES METAL FILM 634K 1% 1/4W
R42	12J22139	RES METAL FILM 213.9K .1% 1/10W
R43	12J21304	RES METAL FILM 130.4K .1% 1/10W
R44	12J19544	RES METAL FILM 95.44K .1% 1/10W
R45	12J17674	RES METAL FILM 76.74K .1% 1/10W
R46	12J16550	RES METAL FILM 65.50K .1% 1/10W
R47	12J15839	RES METAL FILM 58.39K .1% 1/10W
R48	12J15387	RES METAL FILM 53.87K .1% 1/10W
R49	12J15117	RES METAL FILM 51.17K .1% 1/10W
R50	12J14990	RES METAL FILM 49.90K .1% 1/10W
R51	12B23000	RES CARBON 300K 5% 1/4W
R52	12B21000	RES CARBON 100K 5% 1/4W
R53	12B23000	RES CARBON 300K 5% 1/4W
R54	12F12550	RES METAL FILM 25.5K 1% 1/4W
R55	12F23160	RES METAL FILM 316K 1% 1/4W
R56	12FD1370	RES METAL FILM 137 OHM 1% 1/4W
R57	12F11020	RES METAL FILM 10.2K 1% 1/4W
R58	12F23570	RES METAL FILM 357K 1% 1/4W
R59	12FD3400	RES METAL FILM 340 OHM 1% 1/4W
R60	12F02870	RES METAL FILM 2.87K 1% 1/4W
R61	12F23570	RES METAL FILM 357K 1% 1/4W
R62	12FD5620	RES METAL FILM 562 OHM 1% 1/4W
R63	12B31000	RES CARBON 1.0M 5% 1/4W
R64	12B31000	RES CARBON 1.0M 5% 1/4W
R65	12B31000	RES CARBON 1.0M 5% 1/4W
R66	12B31000	RES CARBON 1.0M 5% 1/4W
R67	13A21000A	RES METAL FILM 100K 10% .5W 1 TURN
R68	12B11000	RES CARBON 10K 5% 1/4W
R69	12B21000	RES CARBON 100K 5% 1/4W
R70	12F06190	RES METAL FILM 6.19K 1% 1/4W
R71	12F11000	RES METAL FILM 10.0K 1% 1/4W
R72	12B22400	RES CARBON 240K 5% 1/4W
R73	12F09530	RES METAL FILM 9.53K 1% 1/4W
R74	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R75	12F21330	RES METAL FILM 133K 1% 1/4W
R76	12F13570	RES METAL FILM 35.7K 1% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R77	12F07320	RES METAL FILM 7.32K 1% 1/4W
R78	12F01500	RES METAL FILM 1.50K 1% 1/4W
R79	12F21330	RES METAL FILM 133K 1% 1/4W
R80	12F13570	RES METAL FILM 35.7K 1% 1/4W
R81	12F07320	RES METAL FILM 7.32K 1% 1/4W
R82	12F01500	RES METAL FILM 1.50K 1% 1/4W
R83	12F21330	RES METAL FILM 133K 1% 1/4W
R84	12F13570	RES METAL FILM 35.7K 1% 1/4W
R85	12F07320	RES METAL FILM 7.32K 1% 1/4W
R86	12F01500	RES METAL FILM 1.50K 1% 1/4W
R87	12F11210	RES METAL FILM 12.1K 1% 1/4W
R88	12F03740	RES METAL FILM 3.74K 1% 1/4W
R89	12F14020	RES METAL FILM 40.2K 1% 1/4W
R90	12F14020	RES METAL FILM 40.2K 1% 1/4W
R91	12F11210	RES METAL FILM 12.1K 1% 1/4W
R92	12F02000	RES METAL FILM 2K 1% 1/4W
R93	12F13010	RES METAL FILM 30.1K 1% 1/4W
R94	12F05110	RES METAL FILM 5.11K 1% 1/4W
R95	12F11000	RES METAL FILM 10.0K 1% 1/4W
R96	12F31000	RES METAL FILM 1.00M 1% 1/4W
R103	12F04990	RES METAL FILM 4.99K 1% 1/4W
R104	12F14990	RES METAL FILM 49.9K 1% 1/4W
R105	12F02490	RES METAL FILM 2.49K 1% 1/4W
R106	12FD1500	RES METAL FILM 150 OHM 1% 1/4W
R108	12B32400	RES CARBON 2.4M 5% 1/4W
R109	12J13227	RES METAL FILM 32.27K .1% 1/10W
R110	12J11449	RES METAL FILM 14.49K .1% 1/10W
R111	12B11000	RES CARBON 10K 5% 1/4W
R112	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R113	12FD2940	RES METAL FILM 294 OHM 1% 1/4W
R114	12FD2940	RES METAL FILM 294 OHM 1% 1/4W
R116	12F21000	RES METAL FILM 100K 1% 1/4W
R117	12F01740	RES METAL FILM 1.74K 1% 1/4W
R119	12F11210	RES METAL FILM 12.1K 1% 1/4W
R120	12F14990	RES METAL FILM 49.9K 1% 1/4W
R122	12F01300	RES METAL FILM 1.30K 1% 1/4W
R127	13A11000	RES METAL FILM 10K 10% .5W 1 TURN
R128	12F02050	RES METAL FILM 2.05K 1% 1/4W
R130	12F11370	RES METAL FILM 13.7K 1% 1/4W
R131	12FD5490	RES METAL FILM 549 OHM 1% 1/4W
R132	12F13160	RES METAL FILM 31.6K 1% 1/4W
SW1-10	F42-051	B SWITCH ASSEMBLY SPEC CONTROL DWG
T1	16A00014	TRANSFORMER SIGNAL OUTPUT 1.5:.5:.5
X9	20A00005	SOCKET IC 16 PIN
8	19R00003	CONN TERMINAL
10	21Z00004	SWITCH CAP GRAY/GREEN/CLEAR
1	F42-401-202A	B PC D&T SHIELD BOARD
1	F42-402C-1	C PC D&T GENERATOR
SUB	D4210A-2-2-1	POT BD ASSY
REF	D42-403C	COMPONENT LAYOUT
REF	R42-404D	SCHEMATIC DIAGRAM
	------ END OF FILE -----	

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2-1
DESCRIPTION: POT BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R97	13A11000A1	RES METAL FILM 10K 10% .75W 15 TURN
R107	13A11000A1	RES METAL FILM 10K 10% .75W 15 TURN
R115	13A12000	RES METAL FILM 20K 10% .75W 15 TURN
R118	13A05000A	RES METAL FILM 5K 10% .75W 15 TURN
9	19R00003	CONN TERMINAL
1	F42-401-102A	C PC D&T POT
REF	C42-401-103	COMPONENT LAYOUT
	------ END OF FILE -----	

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0
DESCRIPTION: MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
12	24A06005A	SCREW 6-32 X 5/16 BH-SL-SNP
SUB	D4210B-0-1	TOP MECHANICAL ASSY
SUB	D4210B-0-2	BOTTOM MECHANICAL ASSY
SUB	D4210B-0-3	COVER MECHANICAL ASSY
SUB	D4210B-0-4	WIRE ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-1
DESCRIPTION: TOP MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
2	19F00008	CONN EDGE 22 POSITION DUAL CONTACT
4	23A00038	SPACER 1/4 OD X 1/8 #4 BRASS
2	23B00006	FASTNER ASSEMBLY
1	23D00032	CLAMP CABLE
2	23Z00005	CARD GUIDE
4	24A04012C	SCREW 4-40 X 3/4 FH-SL-SNP
4	24A04102	WASHER FLAT #4 SCP
4	24A04104	WASHER EXT TOOTH #4
10	24A06004A	SCREW 6-32 X 1/4 BH-SL-SNP
4	24A06004C	SCREW 6-32 X 1/4 FH-SL-SNP
5	24A06006A	SCREW 6-32 X 3/8 BH-SL-SNP
11	24A06104	WASHER EXT TOOTH #6
11	24A06204	NUT HEX 6 - 32 X 5/16 SNP
1	F42-008D	C CONNECTOR SUPPORT
1	F42-88A	C COVER 42-10
SUB	D4210B-0-1-1	FRONT PANEL ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-1-1
DESCRIPTION: FRONT PANEL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
1	13B11000A	RES CARBON 10K 10% .5W 1 TURN
2	13B12000	RES WIREWOUND 20K 5% 2W 10 TURN
1	17B00002	TRANSDUCER 340 OHM
4	19B00003	CONN FERRULE
4	19C00004	CONN BINDING POST RED
1	19C00007	CONN BINDING POST METAL
2	19D00004	CONN PHONE 3 CONTACT
2	19D00005	CONN PHONE 2 CONTACT
2	19Z00004	CUFF LINK DIAL POST
2	21E00013	SWITCH TOGGLE 2 POLE 2 THROW
1	21E00015	SWITCH TOGGLE 3 POLE 2 THROW
1	21E00017	SWITCH TOGGLE 3 POLE 2 THROW
1	21E00018	SWITCH TOGGLE 4 POLE 2 THROW
2	21Z00006	SWITCH CAP WHITE
3	21Z00007	SWITCH CAP YELLOW
1	23C00005	KNOB 1/8
2	23C00013	KNOB 1/4 BLACK
1	23D00029	CLAMP 1/8 CABLE
2	23J00004	INSULATOR MICA
2	23L00003	HANDLE RD BLACK
2	24A04003C	SCREW 4-40 X 3/16 FH-SL-SNP
4	24A08010A	SCREW 8-32 X 5/8 BH-SL-SNP
4	24A08101	WASHER EXT TOOTH #8
1	24A08102	WASHER FLAT #8
3	24C00006	LUG 1416-6
2	24Z00006	NUT HEX 3/8 - 32 X 1/2 BNP
1	24Z00019	WASHER FIBER 3/8
4	24Z00023	WASHER 3/8
4	24Z00024	WASHER SHOULDER #6 NYLON
2	26D00001	COMMUNICATIONS GAP
1	F42-011	A DISPLAY WINDOW BRACKET
1	F42-012A	A DISPLAY WINDOW
1	F42-013A	A SPEAKER BRACKET
1	F42-016A	B BRACKET, SWITCH NOISE TO GROUND
1	F42-090C	C F.P. DETAIL 42-10 STD
SUB	D4210B-0-1-1-1	HOLD CIRCUIT ASSY
REF	B42-094	
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-0-1-1-1
DESCRIPTION: HOLD CIRCUIT ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01G32200	CAP TANT ELEC 2.2uF 10% 20V
D1	03J00001	DIODE BRIDGE KBP04 400V 1.5A
L1	15A01000	INDUCTOR 1.0MH 5%
L2	15A01000	INDUCTOR 1.0MH 5%
Q1	05C02484	TRANSISTOR NPN 2N2484
Q2	05D00007	TRANSISTOR NPN MPS-A14
Q3	05D00002	TRANSISTOR NPN MJE182
R1	12F31000	RES METAL FILM 1.00M 1% 1/4W
R2	12FC3090	RES METAL FILM 30.9 OHM 1% 1/4W
1	24A04303	PEM NUT KFS2-440
1	F42-602-3	B PC D&T HOLD CIRCUIT
REF	B42-603	COMPONENT LAYOUT
REF	B42-604	SCHEMATIC DIAGRAM
		------- END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-2
DESCRIPTION: BOTTOM MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
T1	16B00009	TRANSFORMER POWER
T2	16B00009	TRANSFORMER POWER
2	01A11000A1	CAP CER .01uF GMV 1.6KV
1	11A00008	DISPLAY LED MV5254
1	19M00005	CONN POWER CORD
1	19Q00003	CONN HAY RAKE 3 CONTACT
1	21C00004	SWITCH SLIDE 2 POLE 2 THROW
1	21E00016	SWITCH TOGGLE 3 POLE 2 THROW
1	21Z00005	SWITCH CAP RED
1	23A00065	SPACER SPLIT ROLLED ALUM 1/4 X 1/2
2	23B00010	FASTNER LID
1	23D00027	TIE RAP
1	23D00040	HOLDER FUSE
1	23D00042	STRAIN RELIEF
4	23E00002	RUBBER FEET
1	23H00009	TILT STAND RETRACTABLE
2	24A04004A	SCREW 4-40 X 1/4 BH-SL-SNP
3	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
7	24A04102	WASHER FLAT #4 SCP
5	24A04104	WASHER EXT TOOTH #4
8	24A06005A	SCREW 6-32 X 5/16 BH-SL-SNP
6	24A06006A	SCREW 6-32 X 3/8 BH-SL-SNP
4	24A06007A	SCREW 6-32 X 7/16 BH-SL-SNP
2	24A06008A	SCREW 6-32 X 1/2 BH-SL-SNP
2	24A06010A	SCREW 6-32 X 5/8 BH-SL-SNP
4	24A06102	WASHER FLAT #6 SCP
16	24A06104	WASHER EXT TOOTH #6
10	24A06203	NUT HEX 6 - 32 X 1/4 SNP
4	24A06205	LOCKING NUT NYLON INSERT 6 - 32
4	24C00011	LUG CRIMP
1	26A00001	FUSE 1 AMP SB
2	27A00001	BATTERY 12V 1.5AH
1	F42-010C	A XFMR HOLDER, POWER BRACKET
1	F42-02D	C BOTTOM COVER
1	F42-04D	C POWER SUPPLY BRACKETS
1	F42-05B	C BATTERY CASE
1	F42-86	C REAR COVER 42-10
1	F42-89	C REAR PANEL 42-10
SUB	D4210B-0-2-0	PWR SUPPLY MECHANICAL ASSY
SUB	D4210B-0-2-1	BATT/AC PWR SUPPLY BD ASSY
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-2-0
DESCRIPTION: PWR SUPPLY MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
16	19R00003	CONN TERMINAL
2	19R00004	CONN TERMINAL
2	23D00018	HOLDER FUSE
5	23J00004	INSULATOR MICA
2	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
5	24A04008A	SCREW 4-40 X 1/2 BH-SL-SNP
5	24A04102	WASHER FLAT #4 SCP
7	24A04104	WASHER EXT TOOTH #4
2	24A04204	NUT HEX 4 - 40 SNP
5	24A04205	NUT HEX 4 - 40 X 3/16 SNP
1	24A06020A	SCREW 6-32 X 1 1/4 BH-SL-SNP
1	24A06101	WASHER FLAT #6 SNP
1	24A06104	WASHER EXT TOOTH #6
1	24A06204	NUT HEX 6 - 32 X 5/16 SNP
5	24Z00022	WASHER COMPRESSION
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-2-1
DESCRIPTION: BATT/AC PWR SUPPLY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01A21000A	CAP CER .1uF 20% 20V
C2	01G42200A	CAP TANT ELEC 22uF 10% 35V
C3	01A01000	CAP CER 1000PF GMV 1KV
C4	01A21000A	CAP CER .1uF 20% 20V
C5	01G42200A	CAP TANT ELEC 22uF 10% 35V
C6	01A14700	CAP CER .047uF 20% 50V
C7	01A01000	CAP CER 1000PF GMV 1KV
C8	01H52200A1	CAP AL ELEC 220uF -10 +50% 40V
C9	01H61000A	CAP AL ELEC 1000uF -10 +75% 40V
C10	01H61000A	CAP AL ELEC 1000uF -10 +75% 40V
C11	01A11000	CAP CER .01uF 20% 50V
C13	01A21000A	CAP CER .1uF 20% 20V
C14	01G42200	CAP TANT ELEC 22uF 10% 15V
C15	01A21000	CAP CER .1uF 20% 10V
C16	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C18	01A21000A	CAP CER .1uF 20% 20V
C19	01G42200	CAP TANT ELEC 22uF 10% 15V
C20	01A14700	CAP CER .047uF 20% 50V
C21	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C22	01H35000	CAP AL ELEC 5uF -10 +50% 100V
C23	01H52200A1	CAP AL ELEC 220uF -10 +50% 40V
C24	01H52200A	CAP AL ELEC 220uF -10 +50% 25V
C25	01E22200	CAP POLYCARB .22uF 5% 250V
C26	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C27	01E22200	CAP POLYCARB .22uF 5% 250V
C28	01E21000	CAP POLYCARB .1uF 5% 250V
C29	01A11000	CAP CER .01uF 20% 50V
C30	01E11800	CAP POLYCARB .018uF 5% 250V
C31	01A21000	CAP CER .1uF 20% 10V
C32	01A21000A1	CAP CER .1uF 20% 25V
D1	03E04004	DIODE RECTIFIER 1N4004 400V 1A
D2	03J00001	DIODE BRIDGE KBP04 400V 1.5A
D3	03C00823A	DIODE ZENER 1N823A 6.2V 5%
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03F00003	DIODE RECTIFIER MR812 200V 1A
D6	03E04004	DIODE RECTIFIER 1N4004 400V 1A
D7	03F00003	DIODE RECTIFIER MR812 200V 1A
D8	03A03064	DIODE SIGNAL 1N3064 75V
D10	03F00003	DIODE RECTIFIER MR812 200V 1A
F1	26A00001	FUSE 1 AMP SB
F2	26A00001	FUSE 1 AMP SB
IC1	10C00305	IC REGULATOR 305A
IC2	10D00304	IC REGULATOR 304
IC3	08B04558	IC OP AMP 4558
IC4	09Z08212	IC 8212
J1	20A00002	SOCKET IC 16 PIN
L1	15B11000	INDUCTOR 10MH 10%
Q1	05C04401	TRANSISTOR NPN 2N4401
Q2	05C05192	TRANSISTOR NPN 2N5192
Q3	05A05194	TRANSISTOR PNP 2N5194
Q4	05A04403	TRANSISTOR PNP 2N4403
Q5	05A05194	TRANSISTOR PNP 2N5194
Q6	05B00015	TRANSISTOR PNP MPS-A64
Q7	05D00010	TRANSISTOR NPN MPS-U01A

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-2-1
DESCRIPTION: BATT/AC PWR SUPPLY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
Q8	05C04401	TRANSISTOR NPN 2N4401
Q9	05A04403	TRANSISTOR PNP 2N4403
Q10	05B00012	TRANSISTOR PNP MPS-U51A
Q11	05C04401	TRANSISTOR NPN 2N4401
Q12	05C05192	TRANSISTOR NPN 2N5192
Q13	05C04401	TRANSISTOR NPN 2N4401
Q14	05C05192	TRANSISTOR NPN 2N5192
Q15	05C05192	TRANSISTOR NPN 2N5192
Q16	05C05192	TRANSISTOR NPN 2N5192
Q17	05A05194	TRANSISTOR PNP 2N5194
Q18	05A05194	TRANSISTOR PNP 2N5194
Q19	05A04403	TRANSISTOR PNP 2N4403
Q20	05D00010	TRANSISTOR NPN MPS-U01A
Q21	05C04401	TRANSISTOR NPN 2N4401
R1	12CB2700	RES CARBON 2.7 OHM 5% 1/2W
R2	12F08060	RES METAL FILM 8.06K 1% 1/4W
R3	13AD2000A	RES METAL FILM 200 OHM 10% .5W 1 TURN
R4	12F01000	RES METAL FILM 1.00K 1% 1/4W
R5	12BC3300	RES CARBON 33 OHM 5% 1/4W
R6	12F06980	RES METAL FILM 6.98K 1% 1/4W
R7	13A02000	RES METAL FILM 2K 10% .5W 1 TURN
R8	12F02430	RES METAL FILM 2.43K 1% 1/4W
R9	12CB2700	RES CARBON 2.7 OHM 5% 1/2W
R11	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R12	12B01000	RES CARBON 1.0K 5% 1/4W
R13	12B11000	RES CARBON 10K 5% 1/4W
R14	12B01000	RES CARBON 1.0K 5% 1/4W
R15	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R16	12FD4420	RES METAL FILM 442 OHM 1% 1/4W
R17	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R18	12F02740	RES METAL FILM 2.74K 1% 1/4W
R19	12B11000	RES CARBON 10K 5% 1/4W
R20	12BD1000	RES CARBON 100 OHM 5% 1/4W
R21	12B11000	RES CARBON 10K 5% 1/4W
R22	12B01000	RES CARBON 1.0K 5% 1/4W
R23	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R24	12B01000	RES CARBON 1.0K 5% 1/4W
R25	12BD1000	RES CARBON 100 OHM.5% 1/4W
R26	12B02000	RES CARBON 2.0K 5% 1/4W
R27	12F11000	RES METAL FILM 10K 1% 1/4W
R28	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R29	12B21000	RES CARBON 100K 5% 1/4W
R30	12CD8200	RES CARBON 820 OHM 5% 1/2W
R31	12B11000	RES CARBON 10K 5% 1/4W
R32	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R33	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R34	12F09090	RES METAL FILM 9.09K 1% 1/4W
R35	12F11620	RES METAL FILM 16.2K 1% 1/4W
R36	12B13900	RES CARBON 39K 5% 1/4W
R37	12B02000	RES CARBON 2.0K 5% 1/4W
R38	12B11000	RES CARBON 10K 5% 1/4W
R39	12B11000	RES CARBON 10K 5% 1/4W
R40	12LA4700A	RES WIREWOUND .47 OHM 10% 2W
R41	12BD5600	RES CARBON 560 OHM 5% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-2-1
DESCRIPTION: BATT/AC PWR SUPPLY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R42	12B11000	RES CARBON 10K 5% 1/4W
R43	12B11000	RES CARBON 10K 5% 1/4W
R45	12BC1000	RES CARBON 10 OHM 5% 1/4W
R47	12BD3900	RES CARBON 390 OHM 5% 1/4W
R48	12BD3900	RES CARBON 390 OHM 5% 1/4W
R49	12B21100	RES CARBON 110K 5% 1/4W
R50	12B05100	RES CARBON 5.1K 5% 1/4W
R51	12B32200	RES CARBON 2.2M 5% 1/4W
R52	12F12490	RES METAL FILM 24.9K 1% 1/4W
R53	12F22740	RES METAL FILM 274K 1% 1/4W
R54	13A11000	RES METAL FILM 10K 10% .5W 1 TURN
R55	12B01100	RES CARBON 1.1K 5% 1/4W
R56	12F18250	RES METAL FILM 82.5K 1% 1/4W
R57	12F08450	RES METAL FILM 8.45K 1% 1/4W
1	F42-502D	C PC D&T POWER SUPPLY
REF	C42-503D	COMPONENT LAYOUT
REF	R42-504D	SCHEMATIC DIAGRAM
	------ END OF FILE -----	

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-3
DESCRIPTION: COVER MECHANICAL ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
1	23E00002	RUBBER FEET
1	23L00004	HANDLE
1	24A06004A	SCREW 6-32 X 1/4 BH-SL-SNP
3	24A06102	WASHER FLAT #6 SCP
6	24A06104	WASHER EXT TOOTH #6
6	24A06203	NUT HEX 6 - 32 X 1/4 SNP
1	F42-87	C PORTABLE LID 42-10
	------ END OF FILE -----	

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210B-0-4
DESCRIPTION: WIRE ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
1	F42-72A	B MODEL 42 AC & BATTERY CABLE HARNESS
1	F42-078	CABLE MODEL 42-10
REF	A42-76	
	------ END OF FILE -----	

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1
DESCRIPTION: MECHANICAL ASSY FOR 100/200 BD

REF DES./QTY	STOCK NO.	DESCRIPTION
5	23A00030	SPACER 8327 1/40D X 1 LG
10	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
10	24A04102	WASHER FLAT #4 SCP
10	24A04104	WASHER EXT TOOTH #4
SUB	D4210A-1-1	100 BD ASSY
SUB	D4210A-1-2	200 BD ASSY
	------ END OF FILE -----	

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01A04700	CAP CER 4700PF 10% 250V
C2	01G42200	CAP TANT ELEC 22uF 10% 15V
C3	01B00150C	CAP MICA 150PF 5% 500V
C4	01G42200	CAP TANT ELEC 22uF 10% 15V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G42200	CAP TANT ELEC 22uF 10% 15V
C7	01A00010	CAP CER 10PF 0.5PF 1KV
C8	01A11000	CAP CER .01uF 20% 50V
C9	01G42200	CAP TANT ELEC 22uF 10% 15V
C10	01A11000	CAP CER .01uF 20% 50V
C11	01A11000	CAP CER .01uF 20% 50V
C12	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C13	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C14	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C15	01A11000	CAP CER .01uF 20% 50V
C16	01A11000	CAP CER .01uF 20% 50V
C17	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C18	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C19	01G32200	CAP TANT ELEC 2.2uF 10% 20V
C20	01A11000	CAP CER .01uF 20% 50V
C21	01D11000	CAP POLYSTY .01uF 1% 33V
C22	01D05000	CAP POLYSTY 5000PF 1% 33V
C23	01D11000	CAP POLYSTY .01uF 1% 33V
C24	01D05000	CAP POLYSTY 5000PF 1% 33V
C25	01D11000	CAP POLYSTY .01uF 1% 33V
C26	01D01500	CAP POLYSTY 1500PF 1% 33V
C27	01D04700	CAP POLYSTY 4700PF 1% 33V
C28	01D01500	CAP POLYSTY 1500PF 1% 33V
C29	01D07500	CAP POLYSTY 7500PF 1% 33V
C30	01D01000	CAP POLYSTY 1000PF 1% 33V
C31	01D11500	CAP POLYSTY .015uF 1% 33V
C32	01B00270C	CAP MICA 270PF 5% 500V
C33	01E24700	CAP POLYCARB .47uF 5% 100V
C34	01D11000	CAP POLYSTY .01uF 1% 33V
C35	01D11000	CAP POLYSTY .01uF 1% 33V
C36	01D01500	CAP POLYSTY 1500PF 1% 33V
C37	01D11000	CAP POLYSTY .01uF 1% 33V
C38	01D11000	CAP POLYSTY .01uF 1% 33V
C39	01D11000	CAP POLYSTY .01uF 1% 33V
C40	01D02700	CAP POLYSTY 2700PF 1% 33V
C41	01D00220	CAP POLYSTY 220PF 1% 160V
C42	01D11300	CAP POLYSTY .013uF 1% 33V
C43	01D04700	CAP POLYSTY 4700PF 1% 33V
C44	01D03900	CAP POLYSTY 3900PF 1% 33V
C45	01D11000	CAP POLYSTY .01uF 1% 33V
C46	01H47500	CAP AL ELEC 75uF -10 +50% 100V
C47	01A11000	CAP CER .01uF 20% 50V
C50	01H47500	CAP AL ELEC 75uF -10 +50% 100V
C51	01B00150C	CAP MICA 150PF 5% 500V
C53	01B00082C	CAP MICA 82PF 5% 500V
C54	01E22200	CAP POLYCARB .22uF 5% 250V
C56	01D11000	CAP POLYSTY .01uF 1% 33V
C57	01D11000	CAP POLYSTY .01uF 1% 33V
C58	01B00470C	CAP MICA 470PF 5% 500V

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C59	01D11000	CAP POLYSTY .01uF 1% 33V
C60	01D11000	CAP POLYSTY .01uF 1% 33V
C61	01D11000	CAP POLYSTY .01uF 1% 33V
C62	01D11000	CAP POLYSTY .01uF 1% 33V
C63	01B00043C	CAP MICA 43PF 5% 500V
C64	01D11000	CAP POLYSTY .01uF 1% 33V
C65	01D11000	CAP POLYSTY .01uF 1% 33V
C66	01G42200	CAP TANT ELEC 22uF 10% 15V
C67	01G42200	CAP TANT ELEC 22uF 10% 15V
C68	01A21000	CAP CER .1uF 20% 10V
C69	01A21000	CAP CER .1uF 20% 10V
C70	01A21000	CAP CER .1uF 20% 10V
C71	01A21000	CAP CER .1uF 20% 10V
C72	01A21000	CAP CER .1uF 20% 10V
C73	01A21000	CAP CER .1uF 20% 10V
C74	01A21000	CAP CER .1uF 20% 10V
C75	01A21000	CAP CER .1uF 20% 10V
C76	01A21000	CAP CER .1uF 20% 10V
C77	01A21000	CAP CER .1uF 20% 10V
C78	01A21000	CAP CER .1uF 20% 10V
C79	01A21000	CAP CER .1uF 20% 10V
C80	01A21000	CAP CER .1uF 20% 10V
C81	01A21000	CAP CER .1uF 20% 10V
C82	01A21000	CAP CER .1uF 20% 10V
C83	01A21000	CAP CER .1uF 20% 10V
C84	01A21000	CAP CER .1uF 20% 10V
C85	01A21000	CAP CER .1uF 20% 10V
C86	01A21000	CAP CER .1uF 20% 10V
C87	01A21000	CAP CER .1uF 20% 10V
C88	01E32200	CAP POLYCARB 2.2uF 10% 100V
C89	01D05000A	CAP POLYSTY 5000PF 2.5% 33V
C90	01B00430C	CAP MICA 430PF 5% 500V
C91	01B00062C	CAP MICA 62PF 5% 500V
C92	01D01100	CAP POLYSTY 1100PF 1% 33V
C93	01A21000	CAP CER .1uF 20% 10V
C94	01A21000	CAP CER .1uF 20% 10V
C95	01A21000	CAP CER .1uF 20% 10V
C96	01A21000	CAP CER .1uF 20% 10V
C97	01A21000	CAP CER .1uF 20% 10V
C98	01A21000	CAP CER .1uF 20% 10V
C99	01A2100?	CAP CER .1uF 20% 10V
C100	01A210C	CAP CER .1uF 20% 10V
C101	01A2100_	CAP CER .1uF 20% 10V
C102	01A21000	CAP CER .1uF 20% 10V
C103	01A21000	CAP CER .1uF 20% 10V
C104	01A21000	CAP CER .1uF 20% 10V
C105	01A21000	CAP CER .1uF 20% 10V
C106	01A21000	CAP CER .1uF 20% 10V
C107	01E24700	CAP POLYCARB .47uF 5% 100V
C108	01E13300	CAP POLYCARB .033uF 5% 250V
C110	01A11000	CAP CER .01uF 20% 50V
C111	01D02700	CAP POLYSTY 2700PF 1% 33V
C112	01A11000	CAP CER .01uF 20% 50V
D1	03A03064	DIODE SIGNAL 1N3064 75V

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
D2	03A03064	DIODE SIGNAL 1N3064 75V
D3	03A03064	DIODE SIGNAL 1N3064 75V
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03A03064	DIODE SIGNAL 1N3064 75V
D6	03A03064	DIODE SIGNAL 1N3064 75V
D7	03A03064	DIODE SIGNAL 1N3064 75V
D8	03A03064	DIODE SIGNAL 1N3064 75V
D9	03A03064	DIODE SIGNAL 1N3064 75V
D10	03A03064	DIODE SIGNAL 1N3064 75V
D11	03A03064	DIODE SIGNAL 1N3064 75V
D12	03A03064	DIODE SIGNAL 1N3064 75V
D13	03A03064	DIODE SIGNAL 1N3064 75V
D14	03A03064	DIODE SIGNAL 1N3064 75V
D15	03A03064	DIODE SIGNAL 1N3064 75V
D17	03A03064	DIODE SIGNAL 1N3064 75V
D18	03A03064	DIODE SIGNAL 1N3064 75V
D19	03A03064	DIODE SIGNAL 1N3064 75V
D20	03A03064	DIODE SIGNAL 1N3064 75V
IC1	08A00356	IC OP AMP 356
IC2	08B04558	IC OP AMP 4558
IC3	08B04558	IC OP AMP 4558
IC4	08B04558	IC OP AMP 4558
IC5	08A00356	IC OP AMP 356
IC6	08B04558	IC OP AMP 4558
IC7	08B04558	IC OP AMP 4558
IC8	08B04558	IC OP AMP 4558
IC9	08B04558	IC OP AMP 4558
IC10	08B04558	IC OP AMP 4558
IC11	08B04558	IC OP AMP 4558
IC12	08B04558	IC OP AMP 4558
IC13	08B04558	IC OP AMP 4558
IC14	08B04558	IC OP AMP 4558
IC15	08B04558	IC OP AMP 4558
IC16	08B04558	IC OP AMP 4558
IC17	08B04558	IC OP AMP 4558
IC18	08A00356	IC OP AMP 356
L2	15AD4700	INDUCTOR 470uH 10%
L3	15AD2700	INDUCTOR 270uH 10%
Q1	05E05639	TRANSISTOR JFET 2N5639
Q2	05E05639	TRANSISTOR JFET 2N5639
Q3	05E05639	TRANSISTOR JFET 2N5639
Q4	05E05639	TRANSISTOR JFET 2N5639
Q5	05C04401	TRANSISTOR NPN 2N4401
Q6	05C04401	TRANSISTOR NPN 2N4401
Q7	05A05138	TRANSISTOR PNP 2N5138
Q8	05A05138	TRANSISTOR PNP 2N5138
Q9	05A05138	TRANSISTOR PNP 2N5138
Q10	05E05639	TRANSISTOR JFET 2N5639
Q11	05E05639	TRANSISTOR JFET 2N5639
Q12	05E05639	TRANSISTOR JFET 2N5639
Q13	05E05639	TRANSISTOR JFET 2N5639
R1	12F11000	RES METAL FILM 10.0K 1% 1/4W
R2	12J11000	RES METAL FILM 10.00K .1% 1/10W
R3	12J11000	RES METAL FILM 10.00K .1% 1/10W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R4	12B31000	RES CARBON 1.0M 5% 1/4W
R6	12J11000	RES METAL FILM 10.00K .1% 1/10W
R7	12J21000	RES METAL FILM 100.0K .1% 1/10W
R8	12J11000	RES METAL FILM 10.00K .1% 1/10W
R9	12J21000	RES METAL FILM 100.0K .1% 1/10W
R10	12J11000	RES METAL FILM 10.00K .1% 1/10W
R11	12J21000	RES METAL FILM 100.0K .1% 1/10W
R12	12J11000	RES METAL FILM 10.00K .1% 1/10W
R13	12F09530	RES METAL FILM 9.53K 1% 1/4W
R14	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R15	12B21000	RES CARBON 100K 5% 1/4W
R16	12B31000	RES CARBON 1.0M 5% 1/4W
R17	12B21000	RES CARBON 100K 5% 1/4W
R18	12B31000	RES CARBON 1.0M 5% 1/4W
R19	12F11000	RES METAL FILM 10.0K 1% 1/4W
R20	12F11000	RES METAL FILM 10.0K 1% 1/4W
R21	12F11000	RES METAL FILM 10.0K 1% 1/4W
R22	12J11000	RES METAL FILM 10.00K .1% 1/10W
R23	12B31000	RES CARBON 1.0M 5% 1/4W
R24	12B31000	RES CARBON 1.0M 5% 1/4W
R25	12B31000	RES CARBON 1.0M 5% 1/4W
R26	12F21000	RES METAL FILM 100K 1% 1/4W
R27	12F21000	RES METAL FILM 100K 1% 1/4W
R28	12F21000	RES METAL FILM 100K 1% 1/4W
R29	12F21000	RES METAL FILM 100K 1% 1/4W
R30	12J11000	RES METAL FILM 10.00K .1% 1/10W
R31	12B31000	RES CARBON 1.0M 5% 1/4W
R32	12F03830	RES METAL FILM 3.83K 1% 1/4W
R33	12F21000	RES METAL FILM 100K 1% 1/4W
R34	12F03830	RES METAL FILM 3.83K 1% 1/4W
R35	12F03830	RES METAL FILM 3.83K 1% 1/4W
R36	12F21000	RES METAL FILM 100K 1% 1/4W
R37	12F11000	RES METAL FILM 10.0K 1% 1/4W
R38	12F11780	RES METAL FILM 17.8K 1% 1/4W
R39	12B12000	RES CARBON 20K 5% 1/4W
R40	12B21000	RES CARBON 100K 5% 1/4W
R41	12B12000	RES CARBON 20K 5% 1/4W
R42	12B21000	RES CARBON 100K 5% 1/4W
R43	12B12000	RES CARBON 20K 5% 1/4W
R44	12B21000	RES CARBON 100K 5% 1/4W
R45	12B12000	RES CARBON 20K 5% 1/4W
R46	12B31000	RES CARBON 1.0M 5% 1/4W
R47	12F07500	RES METAL FILM 7.50K 1% 1/4W
R48	12F07500	RES METAL FILM 7.50K 1% 1/4W
R49	12B13000	RES CARBON 30K 5% 1/4W
R50	12B13000	RES CARBON 30K 5% 1/4W
R51	12B21000	RES CARBON 100K 5% 1/4W
R52	12B21000	RES CARBON 100K 5% 1/4W
R53	12B21000	RES CARBON 100K 5% 1/4W
R54	12B21000	RES CARBON 100K 5% 1/4W
R55	12J11259	RES METAL FILM 12.59K .1% 1/10W
R56	12F01500	RES METAL FILM 1.50K 1% 1/4W
R57	12F01500	RES METAL FILM 1.50K 1% 1/4W
R58	12J11259	RES METAL FILM 12.59K .1% 1/10W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R59	12J11259	RES METAL FILM 12.59K .1% 1/10W
R60	12F12490	RES METAL FILM 24.9K 1% 1/4W
R61	12F12150	RES METAL FILM 21.5K 1% 1/4W
R62	12F11000	RES METAL FILM 10.0K 1% 1/4W
R65	12F08250	RES METAL FILM 8.25K 1% 1/4W
R66	12F08250	RES METAL FILM 8.25K 1% 1/4W
R67	12F08250	RES METAL FILM 8.25K 1% 1/4W
R68	12F11000	RES METAL FILM 10.0K 1% 1/4W
R69	12F11000	RES METAL FILM 10.0K 1% 1/4W
R70	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R71	12F06650	RES METAL FILM 6.65K 1% 1/4W
R72	12J16252	RES METAL FILM 62.52K .1% 1/10W
R73	12J06033	RES METAL FILM 6.033K .1% 1/10W
R74	12J11000	RES METAL FILM 10.00K .1% 1/10W
R75	12J02589	RES METAL FILM 2.589K .1% 1/10W
R76	12J23128	RES METAL FILM 312.8K .1% 1/10W
R84	12F07680	RES METAL FILM 7.68K 1% 1/4W
R85	12F13920	RES METAL FILM 39.2K 1% 1/4W
R86	12F11370	RES METAL FILM 13.7K 1% 1/4W
R87	12F04990	RES METAL FILM 4.99K 1% 1/4W
R89	12F04990	RES METAL FILM 4.99K 1% 1/4W
R90	12F04990	RES METAL FILM 4.99K 1% 1/4W
R91	12F16040	RES METAL FILM 60.4K 1% 1/4W
R92	12F03830	RES METAL FILM 3.83K 1% 1/4W
R93	13A02000	RES METAL FILM 2K 10% .5W 1 TURN
R94	12F07870	RES METAL FILM 7.87K 1% 1/4W
R95	12F07870	RES METAL FILM 7.87K 1% 1/4W
R96	12F13240	RES METAL FILM 32.4K 1% 1/4W
R97	12F13240	RES METAL FILM 32.4K 1% 1/4W
R98	12F13240	RES METAL FILM 32.4K 1% 1/4W
R99	12F11270	RES METAL FILM 12.7K 1% 1/4W
R100	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R101	12F11000	RES METAL FILM 10.0K 1% 1/4W
R102	12FD2000	RES METAL FILM 200 OHM 1% 1/4W
R103	12FD9090	RES METAL FILM 909 OHM 1% 1/4W
R104	12FD5900	RES METAL FILM 590 OHM 1% 1/4W
R105	12F11270	RES METAL FILM 12.7K 1% 1/4W
R106	12F11740	RES METAL FILM 17.4K 1% 1/4W
R107	12F11000	RES METAL FILM 10.0K 1% 1/4W
R108	12F23010	RES METAL FILM 301K 1% 1/4W
R109	12F11270	RES METAL FILM 12.7K 1% 1/4W
R110	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R111	12F09090	RES METAL FILM 9.09K 1% 1/4W
R112	12F09530	RES METAL FILM 9.53K 1% 1/4W
R113	12F06040	RES METAL FILM 6.04K 1% 1/4W
R114	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R115	12F02870	RES METAL FILM 2.87K 1% 1/4W
R116	12F02870	RES METAL FILM 2.87K 1% 1/4W
R117	12F11370	RES METAL FILM 13.7K 1% 1/4W
R118	12F15360	RES METAL FILM 53.6K 1% 1/4W
R119	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R120	12F03650	RES METAL FILM 3.65K 1% 1/4W
R121	12F11020	RES METAL FILM 10.2K 1% 1/4W
R122	12F01540	RES METAL FILM 1.54K 1% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-1
DESCRIPTION: 100 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R123	12F11430	RES METAL FILM 14.3K 1% 1/4W
R124	12F05360	RES METAL FILM 5.36K 1% 1/4W
R125	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R126	12F04870	RES METAL FILM 4.87K 1% 1/4W
R127	12F03650	RES METAL FILM 3.65K 1% 1/4W
R128	12F05760	RES METAL FILM 5.76K 1% 1/4W
R129	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R130	12F03240	RES METAL FILM 3.24K 1% 1/4W
R131	12F04320	RES METAL FILM 4.32K 1% 1/4W
R132	12F11180	RES METAL FILM 11.8K 1% 1/4W
R133	12F21180	RES METAL FILM 118K 1% 1/4W
R134	12F11870	RES METAL FILM 18.7K 1% 1/4W
R135	12F11780	RES METAL FILM 17.8K 1% 1/4W
R136	13A02000A1	RES METAL FILM 2K 10% .75W 15 TURN
R137	12F02940	RES METAL FILM 2.94K 1% 1/4W
R138	12F01870	RES METAL FILM 1.87K 1% 1/4W
R139	12F08660	RES METAL FILM 8.66K 1% 1/4W
R140	12F11870	RES METAL FILM 18.7K 1% 1/4W
R141	12F11780	RES METAL FILM 17.8K 1% 1/4W
R142	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R143	12F08660	RES METAL FILM 8.66K 1% 1/4W
R144	12F11870	RES METAL FILM 18.7K 1% 1/4W
R145	12F11780	RES METAL FILM 17.8K 1% 1/4W
R146	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R147	12F03010	RES METAL FILM 3.01K 1% 1/4W
R148	12F01000	RES METAL FILM 1.00K 1% 1/4W
R149	12F12430	RES METAL FILM 24.3K 1% 1/4W
R150	12F11870	RES METAL FILM 18.7K 1% 1/4W
R151	12F11780	RES METAL FILM 17.8K 1% 1/4W
R152	13A01000A2	RES METAL FILM 1K 10% .75W 15 TURN
R153	12F11130	RES METAL FILM 11.3K 1% 1/4W
R154	12F11130	RES METAL FILM 11.3K 1% 1/4W
R155	12F11130	RES METAL FILM 11.3K 1% 1/4W
R156	12B04300	RES CARBON 4.3K 5% 1/4W
R157	12B03600	RES CARBON 3.6K 5% 1/4W
SW1-10	F42-050A	B SWITCH ASSEMBLY SPEC CONTROL DWG
T1	16A00022	TRANSFORMER SIGNAL 10K:10K .04-20KHZ
X2	20A00003	SOCKET IC 8 PIN
X3	20A00003	SOCKET IC 8 PIN
X4	20A00003	SOCKET IC 8 PIN
X17	20A00003	SOCKET IC 8 PIN
1	19L00034	CONN 18 CONTACT
10	21Z00004	SWITCH CAP GRAY/GREEN/CLEAR
1	23H00012	MU-METAL CAN
4	23Z00020	INSULATOR GLASS BEAD
1	F-HLI-050	B CAPACITOR SPACER
1	F42-101-102	B P.C. D&T SHIELD BOARD
1	F42-102G-1	C PC D&T INPUT/FILTER
REF	D42-103D-1	COMPONENT LAYOUT
REF	R42-104J-1	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01G36800	CAP TANT ELEC 6.8uF 10% 15V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G36800	CAP TANT ELEC 6.8uF 10% 15V
C7	01A21000	CAP CER .1uF 20% 10V
C8	01A00030	CAP CER 30PF 5% 1KV
C9	01A21000	CAP CER .1uF 20% 10V
C10	01D14700	CAP POLYSTY .047uF 1% 33V
C11	01A21000	CAP CER .1uF 20% 10V
C12	01G42200	CAP TANT ELEC 22uF 10% 15V
C13	01G42200	CAP TANT ELEC 22uF 10% 15V
C14	01G42200	CAP TANT ELEC 22uF 10% 15V
C15	01A11000	CAP CER .01uF 20% 50V
C16	01A00030	CAP CER 30PF 5% 1KV
C17	01A11000	CAP CER .01uF 20% 50V
C18	01A11000	CAP CER .01uF 20% 50V
C19	01A11000	CAP CER .01uF 20% 50V
C20	01A11000	CAP CER .01uF 20% 50V
C21	01A11000	CAP CER .01uF 20% 50V
C22	01A11000	CAP CER .01uF 20% 50V
C23	01A11000	CAP CER .01uF 20% 50V
C24	01A11000	CAP CER .01uF 20% 50V
C25	01A11000	CAP CER .01uF 20% 50V
C26	01A11000	CAP CER .01uF 20% 50V
C27	01A11000	CAP CER .01uF 20% 50V
C28	01A11000	CAP CER .01uF 20% 50V
C29	01A11000	CAP CER .01uF 20% 50V
C30	01A11000	CAP CER .01uF 20% 50V
C31	01A11000	CAP CER .01uF 20% 50V
C32	01A11000	CAP CER .01uF 20% 50V
C33	01A11000	CAP CER .01uF 20% 50V
C34	01A11000	CAP CER .01uF 20% 50V
C35	01A11000	CAP CER .01uF 20% 50V
C36	01A11000	CAP CER .01uF 20% 50V
C37	01A11000	CAP CER .01uF 20% 50V
C38	01A21000	CAP CER .1uF 20% 10V
C39	01A21000	CAP CER .1uF 20% 10V
C40	01A21000	CAP CER .1uF 20% 10V
C41	01A21000	CAP CER .1uF 20% 10V
C42	01A11000	CAP CER .01uF 20% 50V
C43	01A11000	CAP CER .01uF 20% 50V
C44	01A11000	CAP CER .01uF 20% 50V
C45	01A11000	CAP CER .01uF 20% 50V
D1	03A03064	DIODE SIGNAL 1N3064 75V
D2	03A03064	DIODE SIGNAL 1N3064 75V
D3	03A03064	DIODE SIGNAL 1N3064 75V
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03C00823A	DIODE ZENER 1N823A 6.2V 5%
D6	03C05729B	DIODE ZENER 1N5729B 5.1V 5%
D7	03A03064	DIODE SIGNAL 1N3064 75V
D8	03A03064	DIODE SIGNAL 1N3064 75V
D9	03A03064	DIODE SIGNAL 1N3064 75V
D10	03A03064	DIODE SIGNAL 1N3064 75V
D11	03A03064	DIODE SIGNAL 1N3064 75V
D12	03A03064	DIODE SIGNAL 1N3064 75V

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
D13	03A03064	DIODE SIGNAL 1N3064 75V
D14	03A03064	DIODE SIGNAL 1N3064 75V
FC1	19H00006	CABLE FLAT 18 CONTACT 4 IN
IC1	07G04069	IC CMOS 4069UB
IC2	07G04013	IC CMOS 4013B
IC3	07G04011	IC CMOS 4011B
IC4	07G04002	IC CMOS 4002B
IC5	07G04511	IC CMOS 4511B
IC6	07G04511	IC CMOS 4511B
IC7	07G04511	IC CMOS 4511B
IC8	07G04511	IC CMOS 4511B
IC9	07G04011	IC CMOS 4011B
IC10	07G04510	IC CMOS 4510B
IC11	07G04510	IC CMOS 4510B
IC12	07G04510	IC CMOS 4510B
IC13	07G04013	IC CMOS 4013B
IC14	07G04070	IC CMOS 4070B
IC15	07G04001	IC CMOS 4001B
IC16	07G04069	IC CMOS 4069UB
IC17	07G04011	IC CMOS 4011B
IC18	07G04013	IC CMOS 4013B
IC19	07G04023	IC CMOS 4023B
IC20	07G04520	IC CMOS 4520B
IC21	07G14501	IC CMOS 14501UB
IC22	07G04013	IC CMOS 4013B
IC23	07G04001	IC CMOS 4001B
IC24	08B04558	IC OP AMP 4558
IC26	08A00356	IC OP AMP 356
IC27	08A00356	IC OP AMP 356
IC28	08B04558	IC OP AMP 4558
IC29	07G04066	IC CMOS 4066B
IC30	08B04558	IC OP AMP 4558
IC31	07G04066	IC CMOS 4066B
IC32	08A00356	IC OP AMP 356
Q1	05C04401	TRANSISTOR NPN 2N4401
Q2	05C04401	TRANSISTOR NPN 2N4401
Q3	05C04401	TRANSISTOR NPN 2N4401
Q4	05C04401	TRANSISTOR NPN 2N4401
Q5	05C04401	TRANSISTOR NPN 2N4401
R1	12F12000	RES METAL FILM 20.0K 1% 1/4W
R2	12F02430	RES METAL FILM 2.43K 1% 1/4W
R3	12F15490	RES METAL FILM 54.9K 1% 1/4W
R4	12F11000	RES METAL FILM 10.0K 1% 1/4W
R5	12F21500	RES METAL FILM 150K 1% 1/4W
R6	13A21000A	RES METAL FILM 100K 10% .5W 1 TURN
R7	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R10	12B13000	RES CARBON 30K 5% 1/4W
R11	12F12000	RES METAL FILM 20.0K 1% 1/4W
R12	12F12000	RES METAL FILM 20.0K 1% 1/4W
R13	12F11000	RES METAL FILM 10.0K 1% 1/4W
R14	12F12000	RES METAL FILM 20.0K 1% 1/4W
R15	12F05110	RES METAL FILM 5.11K 1% 1/4W
R16	12F02430	RES METAL FILM 2.43K 1% 1/4W
R17	12F12000	RES METAL FILM 20.0K 1% 1/4W

DOC NO:
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R18	12F13010	RES METAL FILM 30.1K 1% 1/4W
R19	12F12000	RES METAL FILM 20.0K 1% 1/4W
R20	12F12000	RES METAL FILM 20.0K 1% 1/4W
R21	13A21000A	RES METAL FILM 100K 10% .5W 1 TURN
R22	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R23	12F13010	RES METAL FILM 30.1K 1% 1/4W
R24	12F13010	RES METAL FILM 30.1K 1% 1/4W
R25	12F13010	RES METAL FILM 30.1K 1% 1/4W
R26	12F17870	RES METAL FILM 78.7K 1% 1/4W
R27	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R28	12F02000	RES METAL FILM 2.00K 1% 1/4W
R29	12FD3740	RES METAL FILM 374 OHM 1% 1/4W
R30	12B41000	RES CARBON 10M 5% 1/4W
R31	12F21740	RES METAL FILM 174K 1% 1/4W
R32	13A12000A	RES METAL FILM 20K 10% .5W 1 TURN
R33	12B13000	RES CARBON 30K 5% 1/4W
R34	12B13000	RES CARBON 30K 5% 1/4W
R35	12B21000	RES CARBON 100K 5% 1/4W
R36	12B21000	RES CARBON 100K 5% 1/4W
R37	12FD2610	RES METAL FILM 261 OHM 1% 1/4W
R38	12B21000	RES CARBON 100K 5% 1/4W
R39	12B11000	RES CARBON 10K 5% 1/4W
R40	12B11000	RES CARBON 10K 5% 1/4W
R41	12B21000	RES CARBON 100K 5% 1/4W
R42	12B21000	RES CARBON 100K 5% 1/4W
R43	12B21000	RES CARBON 100K 5% 1/4W
R44	12B13000	RES CARBON 30K 5% 1/4W
R45	12B13300	RES CARBON 33K 5% 1/4W
R46	12F07150	RES METAL FILM 7.15K 1% 1/4W
R47	12B21000	RES CARBON 100K 5% 1/4W
R48	12F03010	RES METAL FILM 3.01K 1% 1/4W
R49	12F21370	RES METAL FILM 137K 1% 1/4W
R50	12F11000	RES METAL FILM 10.0K 1% 1/4W
R51	12B11000	RES CARBON 10K 5% 1/4W
R52	12F13480	RES METAL FILM 34.8K 1% 1/4W
R53	12B11000	RES CARBON 10K 5% 1/4W
R54	12F01000	RES METAL FILM 1.00K 1% 1/4W
R55	12F25110	RES METAL FILM 511K 1% 1/4W
R56	12B11000	RES CARBON 10K 5% 1/4W
R57	12F21000	RES METAL FILM 100K 1% 1/4W
R58	12B11000	RES CARBON 10K 5% 1/4W
R59	12B11000	RES CARBON 10K 5% 1/4W
R60	12BD2700	RES CARBON 270 OHM 5% 1/4W
R61	12B11000	RES CARBON 10K 5% 1/4W
R62	12BD2700	RES CARBON 270 OHM 5% 1/4W
R63	12B11000	RES CARBON 10K 5% 1/4W
R64	12BD1300	RES CARBON 130 OHM 5% 1/4W
R65	12B21000	RES CARBON 100K 5% 1/4W
R66	12BD2700	RES CARBON 270 OHM 5% 1/4W
R67	12BD2700	RES CARBON 270 OHM 5% 1/4W
R68	12BD2700	RES CARBON 270 OHM 5% 1/4W
R69	12BD2700	RES CARBON 270 OHM 5% 1/4W
R70	12BD2700	RES CARBON 270 OHM 5% 1/4W
R71	12BD2700	RES CARBON 270 OHM 5% 1/4W

DOC NO:
ASSEMBLY NO: D4210A-1-2
DESCRIPTION: 200 BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
R72	12BD2700	RES CARBON 270 OHM 5% 1/4W
R73	12B21000	RES CARBON 100K 5% 1/4W
R74	12BD2700	RES CARBON 270 OHM 5% 1/4W
R75	12BD2700	RES CARBON 270 OHM 5% 1/4W
R76	12BD2700	RES CARBON 270 OHM 5% 1/4W
R77	12BD2700	RES CARBON 270 OHM 5% 1/4W
R78	12BD2700	RES CARBON 270 OHM 5% 1/4W
R79	12BD2700	RES CARBON 270 OHM 5% 1/4W
R80	12BD2700	RES CARBON 270 OHM 5% 1/4W
R81	12BD2700	RES CARBON 270 OHM 5% 1/4W
R82	12BD2700	RES CARBON 270 OHM 5% 1/4W
R83	12BD2700	RES CARBON 270 OHM 5% 1/4W
R84	12BD2700	RES CARBON 270 OHM 5% 1/4W
R85	12BD2700	RES CARBON 270 OHM 5% 1/4W
R86	12BD2700	RES CARBON 270 OHM 5% 1/4W
R87	12BD2700	RES CARBON 270 OHM 5% 1/4W
R88	12B21000	RES CARBON 100K 5% 1/4W
R89	12BC1000	RES CARBON 10 OHM 5% 1/4W
R90	12B21000	RES CARBON 100K 5% 1/4W
R91	12B21000	RES CARBON 100K 5% 1/4W
R92	12B13000	RES CARBON 30K 5% 1/4W
1	F42-101-102	B P.C. D&T SHIELD BOARD
1	F42-202C-2	C PC D&T DVM
SUB	D4210A-1-2-1	DISPLAY BD ASSY
REF	D42-203C	COMPONENT LAYOUT
REF	R42-204D	SCHEMATIC DIAGRAM
		------ END OF FILE ------

DOC NO:
ASSEMBLY NO: D4210A-1-2-1
DESCRIPTION: DISPLAY BD ASSY

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
3	11B00003	DISPLAY LED MAN4640
1	11C00002	DISPLAY LED MAN4605
1	19K00001	CONN PC BOARD 36 CONTACT
4	20A00004	SOCKET IC 14 PIN
1	F42-201-102A	B P.C. D&T DISPLAY
REF	B42-201-103B	COMPONENT LAYOUT
REF	B42-201-104	SCHEMATIC DIAGRAM
		------ END OF FILE ------

DOC NO:
ASSEMBLY NO: D4210A-2
DESCRIPTION: MECHANICAL ASSY FOR 300/400 BD

PARTS LIST BY ASSEMBLY DATE: 5/12/81

REF DES./QTY	STOCK NO.	DESCRIPTION
5	23A00030	SPACER 1/4 OD X 1 4-40 AL
2	23A00031	SPACER 1/4 OD X 1/8 #4 AL
11	24A04005A	SCREW 4-40 X 5/16 BH-SL-SNP
11	24A04102	WASHER FLAT #4 SCP
11	24A04104	WASHER EXT TOOTH #4
1	24A04204	NUT HEX 4 - 40 SNP
SUB	D4210A-2-1	300 BD ASSY
SUB	D4210A-2-2	400 BD ASSY
		------ END OF FILE ------

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-1
DESCRIPTION: 300 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01G42200	CAP TANT ELEC 22uF 10% 15V
C3	01G42200	CAP TANT ELEC 22uF 10% 15V
C4	01G42200	CAP TANT ELEC 22uF 10% 15V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G42200	CAP TANT ELEC 22uF 10% 15V
C7	01G42200	CAP TANT ELEC 22uF 10% 15V
C8	01E24700	CAP POLYCARB .47uF 5% 100V
C9	01E24700	CAP POLYCARB .47uF 5% 100V
C10	01B00200C	CAP MICA 200PF 5% 500V
C11	01A04700	CAP CER 4700PF 10% 250V
C12	01B00033C	CAP MICA 33PF 5% 500V
C13	01B00120C	CAP MICA 120PF 5% 500V
C14	01A00047	CAP CER 47PF 20% 1KV
C15	01A00047	CAP CER 47PF 20% 1KV
C16	01A00047	CAP CER 47PF 20% 1KV
C17	01A00047	CAP CER 47PF 20% 1KV
C18	01A11000	CAP CER .01uF 20% 50V
C19	01A11000	CAP CER .01uF 20% 50V
C20	01A11000	CAP CER .01uF 20% 50V
C21	01A11000	CAP CER .01uF 20% 50V
C22	01A11000	CAP CER .01uF 20% 50V
C23	01A11000	CAP CER .01uF 20% 50V
C24	01A11000	CAP CER .01uF 20% 50V
C25	01A11000	CAP CER .01uF 20% 50V
C26	01A11000	CAP CER .01uF 20% 50V
C27	01A21000	CAP CER .1uF 20% 10V
C28	01A21000	CAP CER .1uF 20% 10V
C29	01A11000	CAP CER .01uF 20% 50V
C30	01A11000	CAP CER .01uF 20% 50V
C31	01A11000	CAP CER .01uF 20% 50V
C32	01A11000	CAP CER .01uF 20% 50V
C33	01A11000	CAP CER .01uF 20% 50V
C34	01A11000	CAP CER .01uF 20% 50V
C35	01A00047	CAP CER 47PF 20% 1KV
D1	03A03064	DIODE SIGNAL 1N3064 75V
D2	03A03064	DIODE SIGNAL 1N3064 75V
D3	03A03064	DIODE SIGNAL 1N3064 75V
D4	03A03064	DIODE SIGNAL 1N3064 75V
D5	03A03064	DIODE SIGNAL 1N3064 75V
D6	03A03064	DIODE SIGNAL 1N3064 75V
D7	03A03064	DIODE SIGNAL 1N3064 75V
D8	03A03064	DIODE SIGNAL 1N3064 75V
D9	03A03064	DIODE SIGNAL 1N3064 75V
D10	03A03064	DIODE SIGNAL 1N3064 75V
D11	03A03064	DIODE SIGNAL 1N3064 75V
D12	03A03064	DIODE SIGNAL 1N3064 75V
D13	03A03064	DIODE SIGNAL 1N3064 75V
FC1	19H00006	CABLE FLAT 18 CONTACT 4 IN
IC1	07G04012	IC CMOS 4012B
IC2	07G04011	IC CMOS 4011B
IC3	07G04020	IC CMOS 4020B
IC4	07G04518	IC CMOS 4518B
IC5	07G04011	IC CMOS 4011B
IC6	07G04518	IC CMOS 4518B

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-1
DESCRIPTION: 300 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
IC7	07G04046	IC CMOS 4046B
IC8	08A00356	IC OP AMP 356
IC9	08A00356	IC OP AMP 356
IC10	07G04013	IC CMOS 4013B
IC11	07G04518	IC CMOS 4518B
IC12	07G04518	IC CMOS 4518B
IC13	07G04011	IC CMOS 4011B
IC14	07G04046	IC CMOS 4046B
IC15	07G04013	IC CMOS 4013B
IC16	07G04011	IC CMOS 4011B
IC17	07G04011	IC CMOS 4011B
IC18	07G04011	IC CMOS 4011B
IC19	07G04011	IC CMOS 4011B
IC20	07K05005	IC PMOS 5005
IC21	07G04013	IC CMOS 4013B
J2	19K00001	CONN PC BOARD 36 CONTACT
Q1	05D00007	TRANSISTOR NPN MPS-A14
Q2	05D00007	TRANSISTOR NPN MPS-A14
Q3	05D00007	TRANSISTOR NPN MPS-A14
Q4	05D00007	TRANSISTOR NPN MPS-A14
Q5	05C04401	TRANSISTOR NPN 2N4401
Q6	05C04401	TRANSISTOR NPN 2N4401
Q7	05C04401	TRANSISTOR NPN 2N4401
Q8	05C04401	TRANSISTOR NPN 2N4401
Q9	05C04401	TRANSISTOR NPN 2N4401
Q10	05C04401	TRANSISTOR NPN 2N4401
Q11	05C04401	TRANSISTOR NPN 2N4401
Q12	05C04401	TRANSISTOR NPN 2N4401
Q13	05C04401	TRANSISTOR NPN 2N4401
R1	12B06200	RES CARBON 6.2K 5% 1/4W
R2	12B21600	RES CARBON 160K 5% 1/4W
R3	12B21000	RES CARBON 100K 5% 1/4W
R4	12B04300	RES CARBON 4.3K 5% 1/4W
R5	12BD5100	RES CARBON 510 OHM 5% 1/4W
R6	12B31000	RES CARBON 1.0M 5% 1/4W
R7	12B23300	RES CARBON 330K 5% 1/4W
R8	12B21000	RES CARBON 100K 5% 1/4W
R9	12B25600	RES CARBON 560K 5% 1/4W
R10	12B11100	RES CARBON 11K 5% 1/4W
R11	12B11000	RES CARBON 10K 5% 1/4W
R12	12B21000	RES CARBON 100K 5% 1/4W
R13	12B21000	RES CARBON 100K 5% 1/4W
R14	12B21000	RES CARBON 100K 5% 1/4W
R15	12B41000	RES CARBON 10M 5% 1/4W
R16	12B02000	RES CARBON 2K 5% 1/4W
R17	12B21000	RES CARBON 100K 5% 1/4W
R18	12B11000	RES CARBON 10K 5% 1/4W
R19	12B13000	RES CARBON 30K 5% 1/4W
R20	12B21000	RES CARBON 100K 5% 1/4W
R21	12B21000	RES CARBON 100K 5% 1/4W
R22	12B21000	RES CARBON 100K 5% 1/4W
R23	12B21000	RES CARBON 100K 5% 1/4W
R24	12B16800	RES CARBON 68K 5% 1/4W
R25	12B16800	RES CARBON 68K 5% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-1
DESCRIPTION: 300 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R26	12B04700	RES CARBON 4.7K 5% 1/4W
R27	12B21000	RES CARBON 100K 5% 1/4W
R28	12B11000	RES CARBON 10K 5% 1/4W
R29	12B11200	RES CARBON 12K 5% 1/4W
R30	12B11200	RES CARBON 12K 5% 1/4W
R31	12B12000	RES CARBON 20K 5% 1/4W
R32	12B12000	RES CARBON 20K 5% 1/4W
R33	12B12000	RES CARBON 20K 5% 1/4W
R34	12B12000	RES CARBON 20K 5% 1/4W
R35	12B01800	RES CARBON 1.8K 5% 1/4W
R36	12B01800	RES CARBON 1.8K 5% 1/4W
R37	12B01800	RES CARBON 1.8K 5% 1/4W
R38	12B01800	RES CARBON 1.8K 5% 1/4W
R39	12B01800	RES CARBON 1.8K 5% 1/4W
R40	12B01800	RES CARBON 1.8K 5% 1/4W
R41	12B01800	RES CARBON 1.8K 5% 1/4W
R42	12BC6200	RES CARBON 62 OHM 5% 1/4W
R43	12BC6200	RES CARBON 62 OHM 5% 1/4W
R44	12BC6200	RES CARBON 62 OHM 5% 1/4W
R45	12BC6200	RES CARBON 62 OHM 5% 1/4W
R46	12BC6200	RES CARBON 62 OHM 5% 1/4W
R47	12BC6200	RES CARBON 62 OHM 5% 1/4W
R48	12BC6200	RES CARBON 62 OHM 5% 1/4W
R49	12BC6200	RES CARBON 62 OHM 5% 1/4W
R50	12BC6200	RES CARBON 62 OHM 5% 1/4W
R51	12B11000	RES CARBON 10K 5% 1/4W
R52	12B19100	RES CARBON 91K 5% 1/4W
R53	12B19100	RES CARBON 91K 5% 1/4W
R54	12B05100	RES CARBON 5.1K 5% 1/4W
R55	12B05100	RES CARBON 5.1K 5% 1/4W
R56	12B21000	RES CARBON 100K 5% 1/4W
R57	12B16200	RES CARBON 62K 5% 1/4W
XTAL1	25A00005	CRYSTAL 2.0MHZ 32 PF
2	20A00005	SOCKET IC 16 PIN
1	F42-302D-2	C PC D&T COUNTER
SUB	D4210A-2-1-1	DISPLAY BD ASSY
REF	D42-303B	COMPONENT LAYOUT
REF	R42-304F	SCHEMATIC DIAGRAM
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-1-1
DESCRIPTION: DISPLAY BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
4	11B00003	DISPLAY LED MAN4640
4	20A00004	SOCKET IC 14 PIN
1	F42-301-102A	B PC D&T DISPLAY
REF	B42-301-103	COMPONENT LAYOUT
		------ END OF FILE -----

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C1	01A21000	CAP CER .1uF 20% 10V
C2	01A21000	CAP CER .1uF 20% 10V
C3	01H44700	CAP AL ELEC .47uF -10 +100% 35V
C4	01H44700	CAP AL ELEC 47uF -10 +100% 35V
C5	01G42200	CAP TANT ELEC 22uF 10% 15V
C6	01G42200	CAP TANT ELEC 22uF 10% 15V
C7	01G42200	CAP TANT ELEC 22uF 10% 15V
C8	01B00068C	CAP MICA 68PF 5% 500V
C9	01B00018C	CAP MICA 18PF 5% 500V
C10	01F24700A	CAP POLYEST .47uF 5% 250V
C11	01B00047C	CAP MICA 47PF 5% 500V
C13	01A21000	CAP CER .1uF 20% 10V
C14	01D12200	CAP POLYSTY .022uF 1% 33V
C15	01G42200	CAP TANT ELEC 22uF 10% 15V
C16	01E24700	CAP POLYCARB .47uF 5% 100V
C17	01E24700	CAP POLYCARB .47uF 5% 100V
C18	01A11000	CAP CER .01uF 20% 50V
C19	01G42200	CAP TANT ELEC 22uF 10% 15V
C20	01G42200	CAP TANT ELEC 22uF 10% 15V
C21	01D04700	CAP POLYSTY 4700PF 1% 33V
C22	01D11200	CAP POLYSTY .012uF 1% 33V
C23	01D00680	CAP POLYSTY 680PF 1% 33V
C24	01D14700	CAP POLYSTY .047uF 1% 33V
C25	01D01000	CAP POLYSTY 1000PF 1% 33V
C26	01D14700	CAP POLYSTY .047uF 1% 33V
C27	01D01000	CAP POLYSTY 1000PF 1% 33V
C28	01A21000A	CAP CER .1uF 20% 20V
C29	01B00100C1	CAP MICA 100PF 5% 500V
C30	01D01000	CAP POLYSTY 1000PF 1% 33V
C31	01D14700	CAP POLYSTY .047uF 1% 33V
C32	01B00047C	CAP MICA 47PF 5% 500V
C33	01H52200A	CAP AL ELEC 220uF -10 +50% 25V
C34	01D00750	CAP POLYSTY 750PF 1% 33V
C35	01H51000A	CAP AL ELEC 100uF 100V
C36	01H51000A	CAP AL ELEC 100uF 100V
C37	01A11000	CAP CER .01uF 20% 50V
C38	01A11000	CAP CER .01uF 20% 50V
C39	01G42200	CAP TANT ELEC 22uF 10% 15V
C40	01A11000	CAP CER .01uF 20% 50V
C41	01A11000	CAP CER .01uF 20% 50V
C42	01A11000	CAP CER .01uF 20% 50V
C43	01A11000	CAP CER .01uF 20% 50V
C44	01A11000	CAP CER .01uF 20% 50V
C45	01A11000	CAP CER .01uF 20% 50V
C46	01A11000	CAP CER .01uF 20% 50V
C47	01A11000	CAP CER .01uF 20% 50V
C48	01A21000	CAP CER .1uF 20% 10V
C49	01A11000	CAP CER .01uF 20% 50V
C50	01A11000	CAP CER .01uF 20% 50V
C51	01A11000	CAP CER .01uF 20% 50V
C52	01A21000	CAP CER .1uF 20% 10V
C53	01A11000	CAP CER .01uF 20% 50V
C54	01A11000	CAP CER .01uF 20% 50V
C55	01A11000	CAP CER .01uF 20% 50V

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
C56	01A21000	CAP CER .1uF 20% 10V
C57	01A21000	CAP CER .1uF 20% 10V
C58	01G42200	CAP TANT ELEC 22uF 10% 15V
C61	01D06800	CAP POLYSTY 6800PF 1% 33V
C62	01D00390A	CAP POLYSTY 390PF 2.5% 33V
D1	03A03064	DIODE SIGNAL 1N3064 75V
D2	03C00823A	DIODE ZENER 1N823A 6.2V 5%
IC1	08B04558	IC OP AMP 4558
IC2	07G04066	IC CMOS 4066B
IC3	07G04046	IC CMOS 4046B
IC4	07G04013	IC CMOS 4013B
IC5	07G04066	IC CMOS 4066B
IC6	08B04558	IC OP AMP 4558
IC7	07G04011	IC CMOS 4011B
IC8	07G04510	IC CMOS 4510B
IC9	07G04028	IC CMOS 4028B
IC10	08B04558	IC OP AMP 4558
IC11	07G04066	IC CMOS 4066B
IC12	07G04066	IC CMOS 4066B
IC13	07G04066	IC CMOS 4066B
IC14	08B04558	IC OP AMP 4558
IC15	08B04558	IC OP AMP 4558
IC17	08B04558	IC OP AMP 4558
IC18	08B04558	IC OP AMP 4558
IC19	08B04558	IC OP AMP 4558
IC20	08A00356	IC OP AMP 356
IC21	08A00356	IC OP AMP 356
IC22	08B04558	IC OP AMP 4558
J1	19H00006	CABLE FLAT 18 CONTACT 4 IN
Q1	05C04401	TRANSISTOR NPN 2N4401
Q2	05A04403	TRANSISTOR PNP 2N4403
Q3	05D00008	TRANSISTOR NPN MPS-A18
R1	12BD1300	RES CARBON 130 OHM 5% 1/4W
R2	12B11200	RES CARBON 12K 5% 1/4W
R3	12B15100	RES CARBON 51K 5% 1/4W
R4	12BD1300	RES CARBON 130 OHM 5% 1/4W
R5	12B01100	RES CARBON 1.1K 5% 1/4W
R6	12B11200	RES CARBON 12K 5% 1/4W
R7	12F11500	RES METAL FILM 15.0K 1% 1/4W
R8	12B21000	RES CARBON 100K 5% 1/4W
R9	12B11000	RES CARBON 10K 5% 1/4W
R10	12F13090	RES METAL FILM 30.9K 1% 1/4W
R11	12B11500	RES CARBON 15K 5% 1/4W
R12	12B11200	RES CARBON 12K 5% 1/4W
R13	12F12490	RES METAL FILM 24.9K 1% 1/4W
R14	12BD5100	RES CARBON 510 OHM 5% 1/4W
R15	12F18060	RES METAL FILM 80.6K 1% 1/4W
R16	12F12740	RES METAL FILM 27.4K 1% 1/4W
R17	12F12740	RES METAL FILM 27.4K 1% 1/4W
R18	12F18060	RES METAL FILM 80.6K 1% 1/4W
R19	12F12740	RES METAL FILM 27.4K 1% 1/4W
R20	12F12740	RES METAL FILM 27.4K 1% 1/4W
R21	13A05000	RES METAL FILM 5K 10% .5W 1 TURN
R22	12F13650	RES METAL FILM 36.5K 1% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R23	12F11780	RES METAL FILM 17.8K 1% 1/4W
R24	12FD2740	RES METAL FILM 274 OHM 1% 1/4W
R25	12F13010	RES METAL FILM 30.1K 1% 1/4W
R26	12F05110	RES METAL FILM 5.11K 1% 1/4W
R27	12F12000	RES METAL FILM 20.0K 1% 1/4W
R28	12B14700	RES CARBON 47K 5% 1/4W
R29	12F11000	RES METAL FILM 10.0K 1% 1/4W
R30	12F13320	RES METAL FILM 33.2K 1% 1/4W
R31	12F15110	RES METAL FILM 51.1K 1% 1/4W
R32	12F01000	RES METAL FILM 1.00K 1% 1/4W
R33	12F11650	RES METAL FILM 16.5K 1% 1/4W
R34	12F15110	RES METAL FILM 51.1K 1% 1/4W
R35	12F12000	RES METAL FILM 20.0K 1% 1/4W
R36	12F21000	RES METAL FILM 100K 1% 1/4W
R37	12F21000	RES METAL FILM 100K 1% 1/4W
R38	12F11000	RES METAL FILM 10.0K 1% 1/4W
R39	12B32400	RES CARBON 2.4M 5% 1/4W
R40	12B32400	RES CARBON 2.4M 5% 1/4W
R41	12F26340	RES METAL FILM 634K 1% 1/4W
R42	12J22139	RES METAL FILM 213.9K .1% 1/10W
R43	12J21304	RES METAL FILM 130.4K .1% 1/10W
R44	12J19544	RES METAL FILM 95.44K .1% 1/10W
R45	12J17674	RES METAL FILM 76.74K .1% 1/10W
R46	12J16550	RES METAL FILM 65.50K .1% 1/10W
R47	12J15839	RES METAL FILM 58.39K .1% 1/10W
R48	12J15387	RES METAL FILM 53.87K .1% 1/10W
R49	12J15117	RES METAL FILM 51.17K .1% 1/10W
R50	12J14990	RES METAL FILM 49.90K .1% 1/10W
R51	12B23000	RES CARBON 300K 5% 1/4W
R52	12B21000	RES CARBON 100K 5% 1/4W
R53	12B23000	RES CARBON 300K 5% 1/4W
R54	12F12550	RES METAL FILM 25.5K 1% 1/4W
R55	12F23160	RES METAL FILM 316K 1% 1/4W
R56	12FD1370	RES METAL FILM 137 OHM 1% 1/4W
R57	12F11020	RES METAL FILM 10.2K 1% 1/4W
R58	12F23570	RES METAL FILM 357K 1% 1/4W
R59	12FD3400	RES METAL FILM 340 OHM 1% 1/4W
R60	12F02870	RES METAL FILM 2.87K 1% 1/4W
R61	12F23570	RES METAL FILM 357K 1% 1/4W
R62	12FD5620	RES METAL FILM 562 OHM 1% 1/4W
R63	12B31000	RES CARBON 1.0M 5% 1/4W
R64	12B31000	RES CARBON 1.0M 5% 1/4W
R65	12B31000	RES CARBON 1.0M 5% 1/4W
R66	12B31000	RES CARBON 1.0M 5% 1/4W
R67	13A21000A	RES METAL FILM 100K 10% .5W 1 TURN
R68	12B11000	RES CARBON 10K 5% 1/4W
R69	12B21000	RES CARBON 100K 5% 1/4W
R70	12F06190	RES METAL FILM 6.19K 1% 1/4W
R71	12F11000	RES METAL FILM 10.0K 1% 1/4W
R72	12B22400	RES CARBON 240K 5% 1/4W
R73	12F09530	RES METAL FILM 9.53K 1% 1/4W
R74	13A01000A	RES METAL FILM 1K 10% .5W 1 TURN
R75	12F21330	RES METAL FILM 133K 1% 1/4W
R76	12F13570	RES METAL FILM 35.7K 1% 1/4W

DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2
DESCRIPTION: 400 BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R77	12F07320	RES METAL FILM 7.32K 1% 1/4W
R78	12F01500	RES METAL FILM 1.50K 1% 1/4W
R79	12F21330	RES METAL FILM 133K 1% 1/4W
R80	12F13570	RES METAL FILM 35.7K 1% 1/4W
R81	12F07320	RES METAL FILM 7.32K 1% 1/4W
R82	12F01500	RES METAL FILM 1.50K 1% 1/4W
R83	12F21330	RES METAL FILM 133K 1% 1/4W
R84	12F13570	RES METAL FILM 35.7K 1% 1/4W
R85	12F07320	RES METAL FILM 7.32K 1% 1/4W
R86	12F01500	RES METAL FILM 1.50K 1% 1/4W
R87	12F11210	RES METAL FILM 12.1K 1% 1/4W
R88	12F03740	RES METAL FILM 3.74K 1% 1/4W
R89	12F14020	RES METAL FILM 40.2K 1% 1/4W
R90	12F14020	RES METAL FILM 40.2K 1% 1/4W
R91	12F11210	RES METAL FILM 12.1K 1% 1/4W
R92	12F02000	RES METAL FILM 2K 1% 1/4W
R93	12F13010	RES METAL FILM 30.1K 1% 1/4W
R94	12F05110	RES METAL FILM 5.11K 1% 1/4W
R95	12F11000	RES METAL FILM 10.0K 1% 1/4W
R96	12F31000	RES METAL FILM 1.00M 1% 1/4W
R103	12F04990	RES METAL FILM 4.99K 1% 1/4W
R104	12F14990	RES METAL FILM 49.9K 1% 1/4W
R105	12F02490	RES METAL FILM 2.49K 1% 1/4W
R106	12FD1500	RES METAL FILM 150 OHM 1% 1/4W
R108	12B32400	RES CARBON 2.4M 5% 1/4W
R109	12J13227	RES METAL FILM 32.27K .1% 1/10W
R110	12J11449	RES METAL FILM 14.49K .1% 1/10W
R111	12B11000	RES CARBON 10K 5% 1/4W
R112	12FD3010	RES METAL FILM 301 OHM 1% 1/4W
R113	12FD2940	RES METAL FILM 294 OHM 1% 1/4W
R114	12FD2940	RES METAL FILM 294 OHM 1% 1/4W
R116	12F21000	RES METAL FILM 100K 1% 1/4W
R117	12F01740	RES METAL FILM 1.74K 1% 1/4W
R119	12F11210	RES METAL FILM 12.1K 1% 1/4W
R120	12F14990	RES METAL FILM 49.9K 1% 1/4W
R122	12F01300	RES METAL FILM 1.30K 1% 1/4W
R127	13A11000	RES METAL FILM 10K 10% .5W 1 TURN
R128	12F02050	RES METAL FILM 2.05K 1% 1/4W
R130	12F11370	RES METAL FILM 13.7K 1% 1/4W
R131	12FD5490	RES METAL FILM 549 OHM 1% 1/4W
R132	12F13160	RES METAL FILM 31.6K 1% 1/4W
SW1-10	F42-051	B SWITCH ASSEMBLY SPEC CONTROL DWG
T1	16A00014	TRANSFORMER SIGNAL OUTPUT 1.5:1.5:1.5
X9	20A00005	SOCKET IC 16 PIN
8	19R00003	CONN TERMINAL
10	21Z00004	SWITCH CAP GRAY/GREEN/CLEAR
1	F42-401-202A	B PC D&T SHIELD BOARD
1	F42-402C-1	C PC D&T GENERATOR
SUB	D4210A-2-2-1	POT BD ASSY
REF	D42-403C	COMPONENT LAYOUT
REF	R42-404D	SCHEMATIC DIAGRAM

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DOC NO: **PARTS LIST BY ASSEMBLY** DATE: 5/12/81
ASSEMBLY NO: D4210A-2-2-1
DESCRIPTION: POT BD ASSY

REF DES./QTY	STOCK NO.	DESCRIPTION
R97	13A11000A1	RES METAL FILM 10K 1% .75W 15 TURN
R107	13A11000A1	RES METAL FILM 10K 1% .75W 15 TURN
R115	13A12000	RES METAL FILM 20K 1% .75W 15 TURN
R118	13A05000A	RES METAL FILM 5K 1% .75W 15 TURN
9	19R00003	CONN TERMINAL
1	F42-401-102A	C PC D&T POT
REF	C42-401-103	COMPONENT LAYOUT
		------ END OF FILE -----

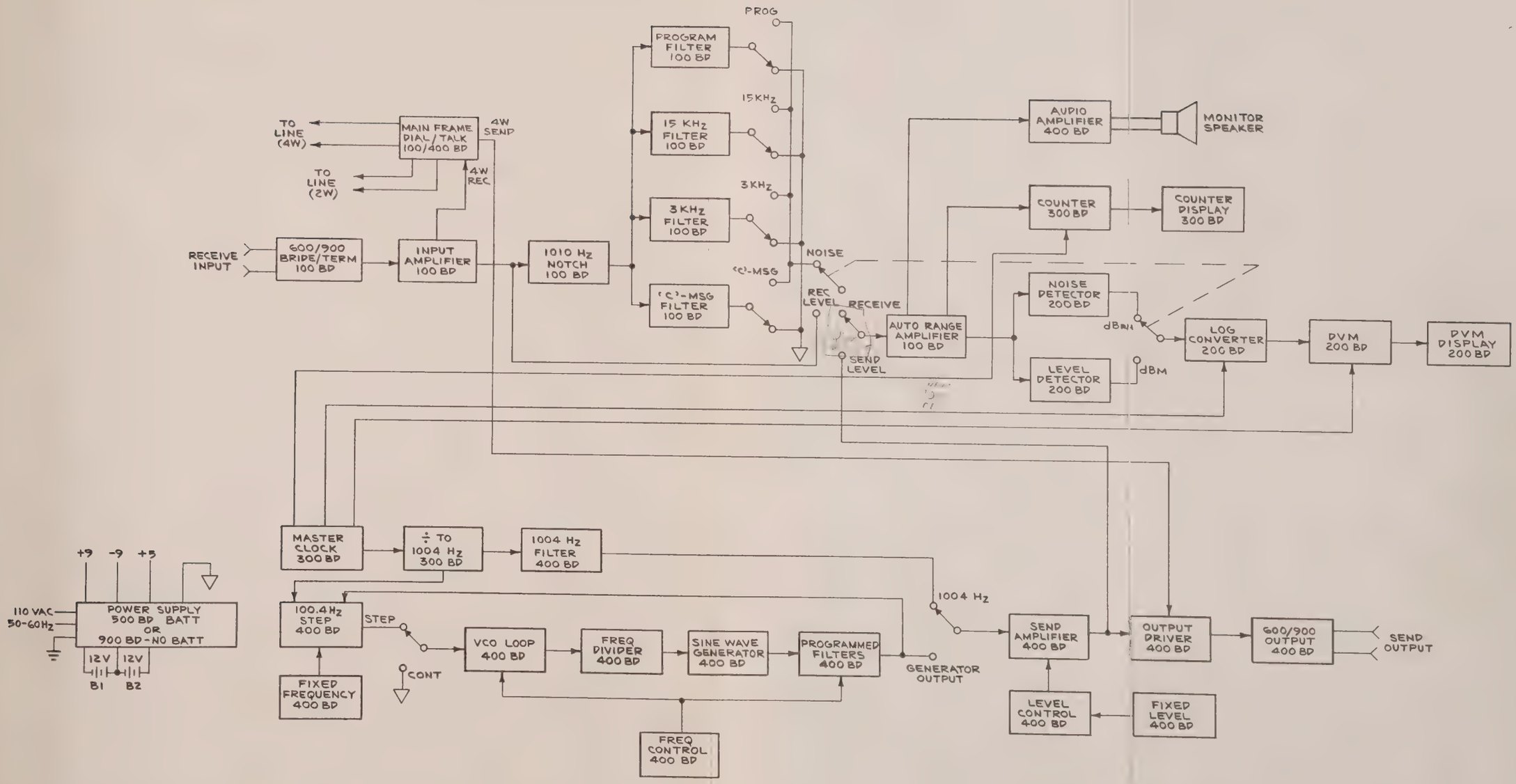


FIGURE 5-1. MODEL 42-10 BLOCK DIAGRAM

FIGURE 5-2. INPUT/FILTER COMPONENT LAYOUT

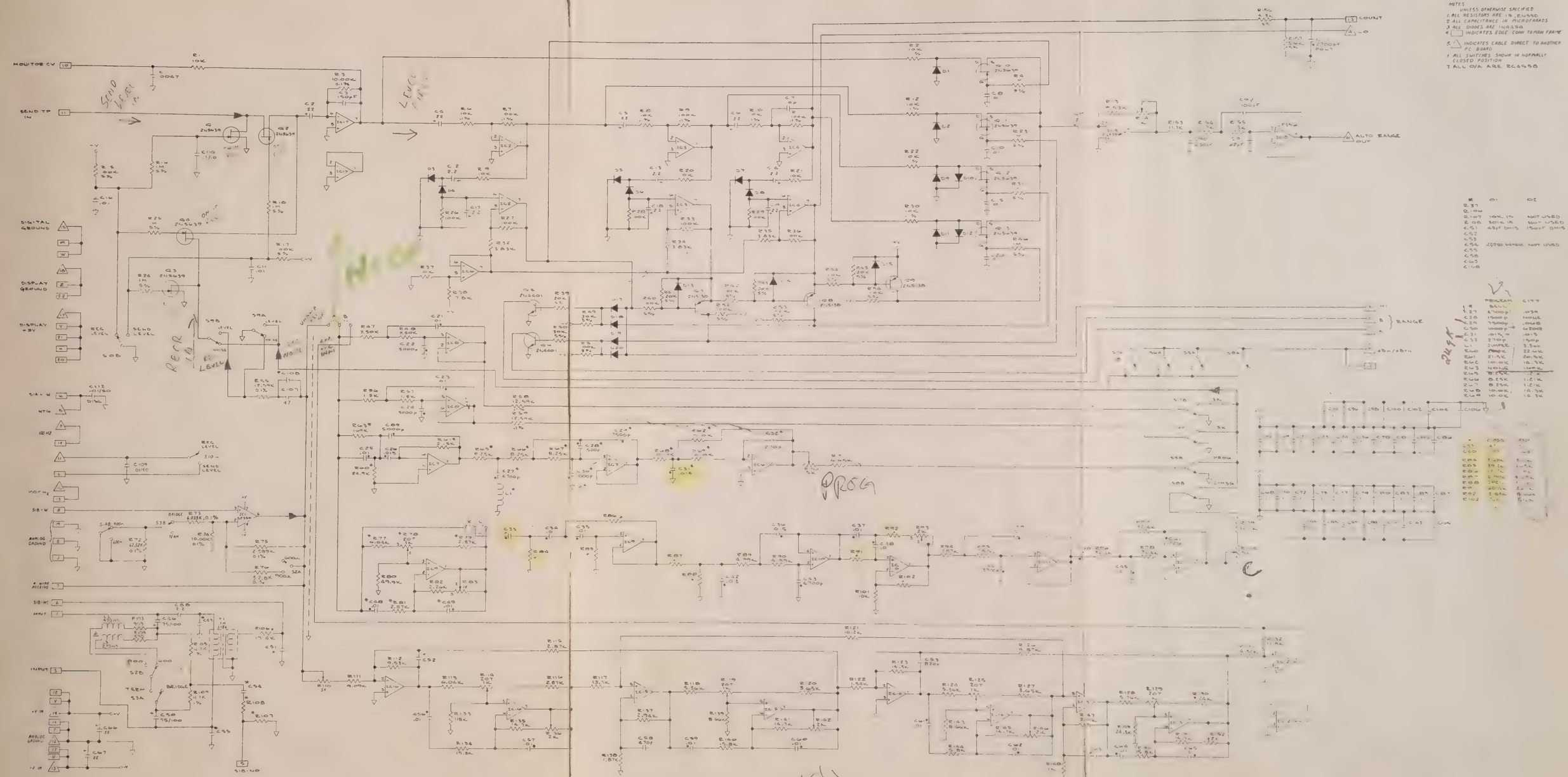


FIGURE 5-3. INPUT/FILTER SCHEMATIC

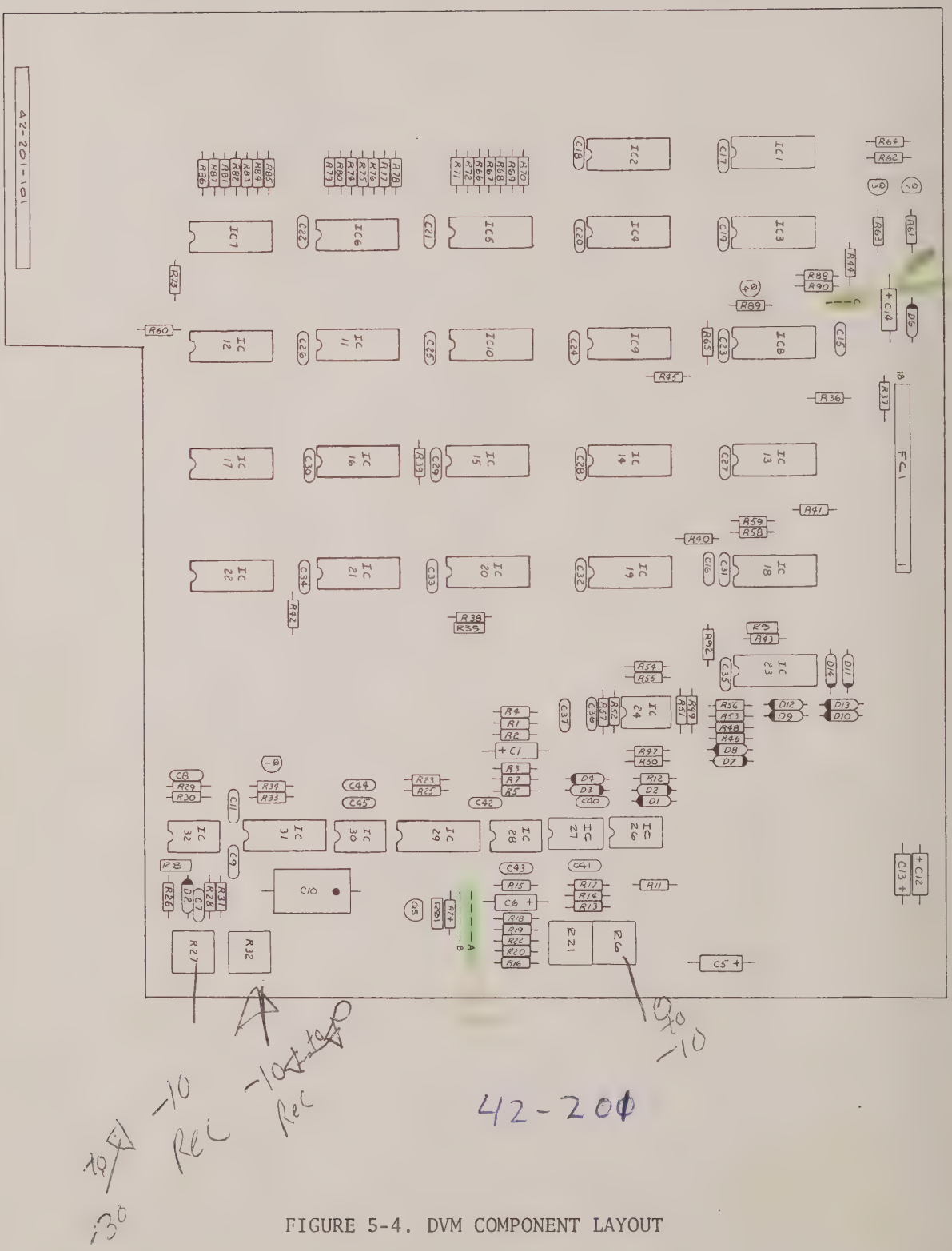


FIGURE 5-4. DVM COMPONENT LAYOUT

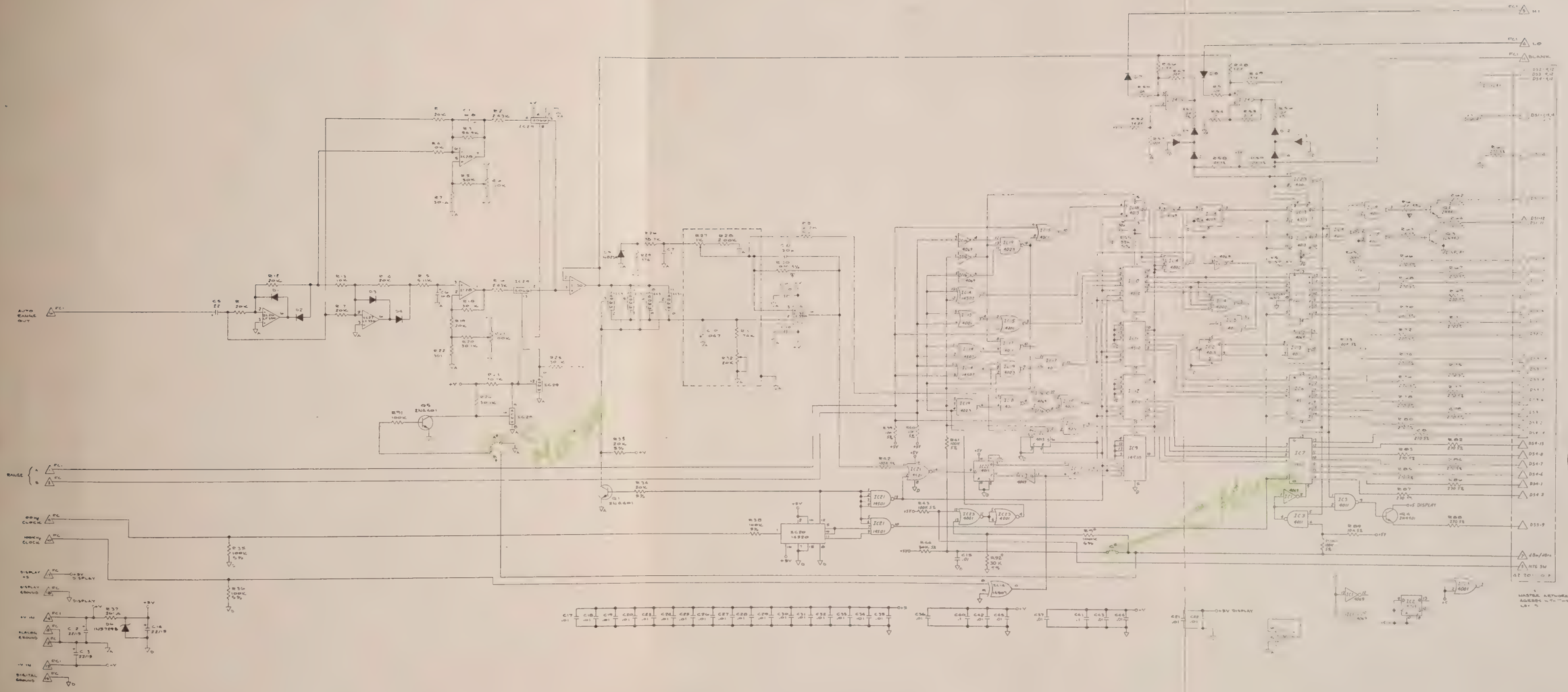
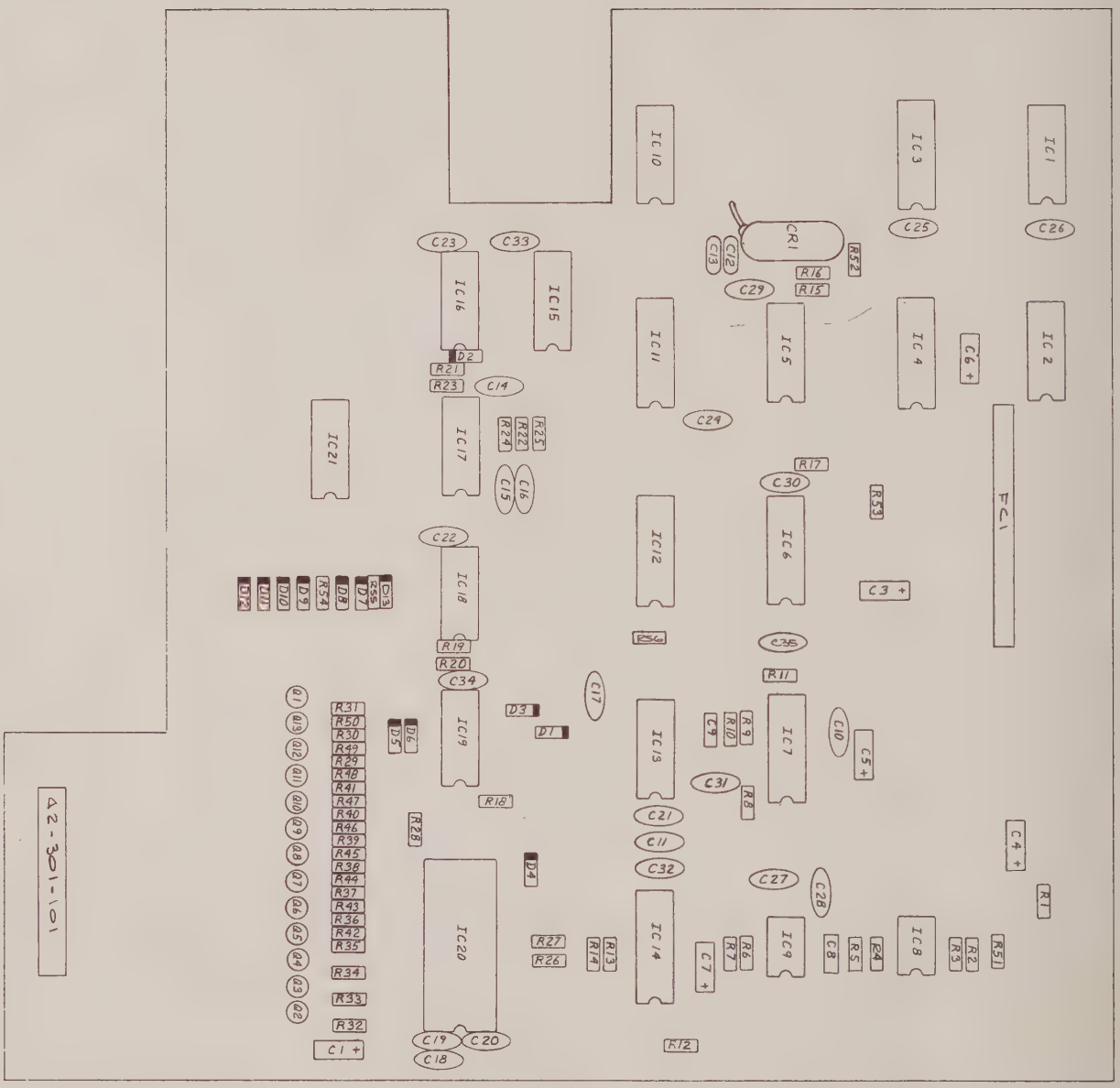


FIGURE 5-5. DVM SCHEMATIC

42 -201


A2-301-101
IC1
IC2
IC3
IC4
IC5
IC6
IC7
IC8
IC9
IC10
IC11
IC12
IC13
IC14
IC15
IC16
IC17
IC18
IC19
IC20
IC21
CR1
FC1
C1 +
C3 +
C4 +
C5 +
C6 +
C7 +
C8
C9
C10
C11
C12
C13
C14
C15
C17
C18
C19
C20
C21
C23
C24
C25
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C27
C28
C29
C30
C31
C32
C33
C34
C35
R1
R2
R3
R4
R5
R6
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R42
R43
R44
R45
R46
R47
R48
R49
R50
R51
R52
R56
D1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
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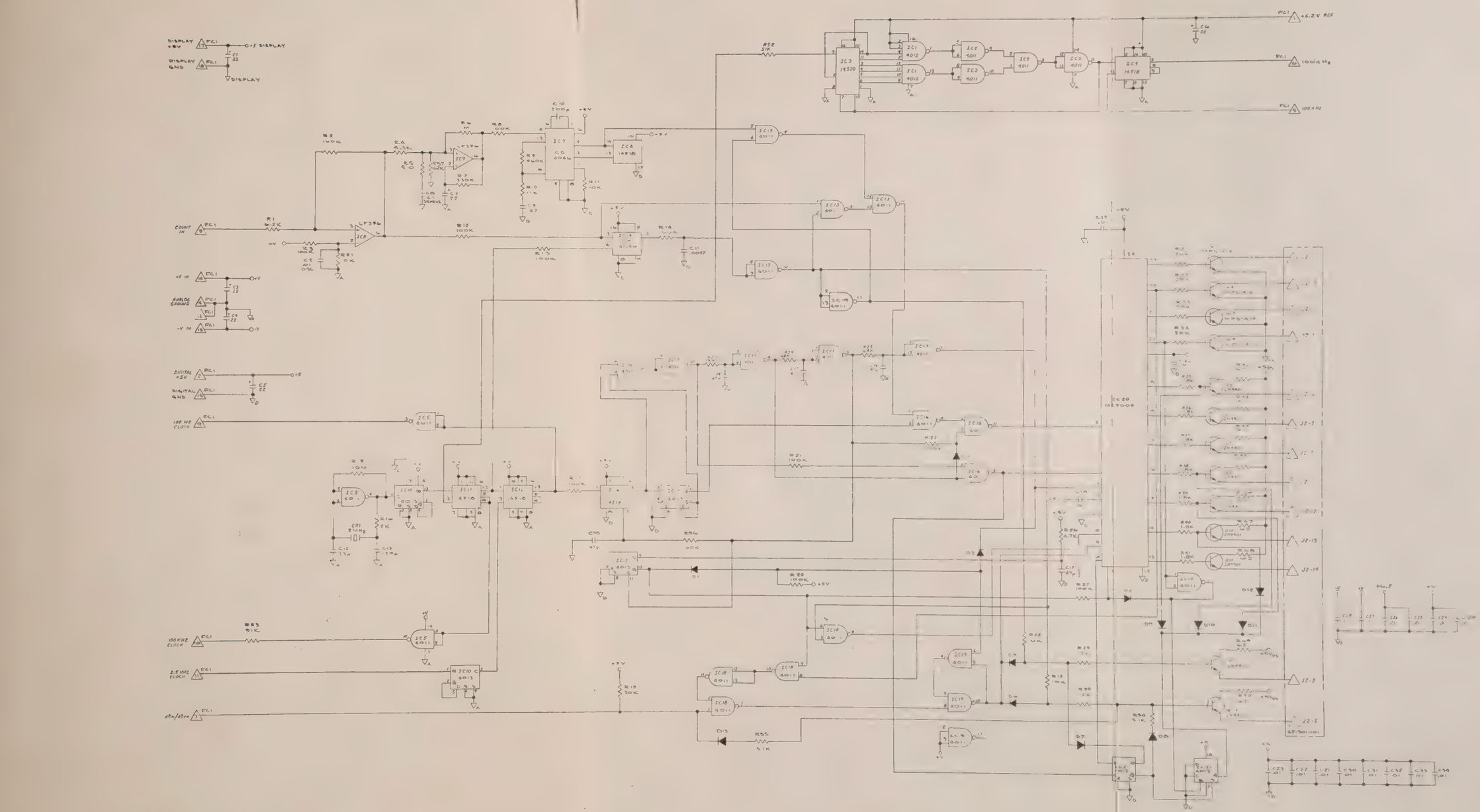
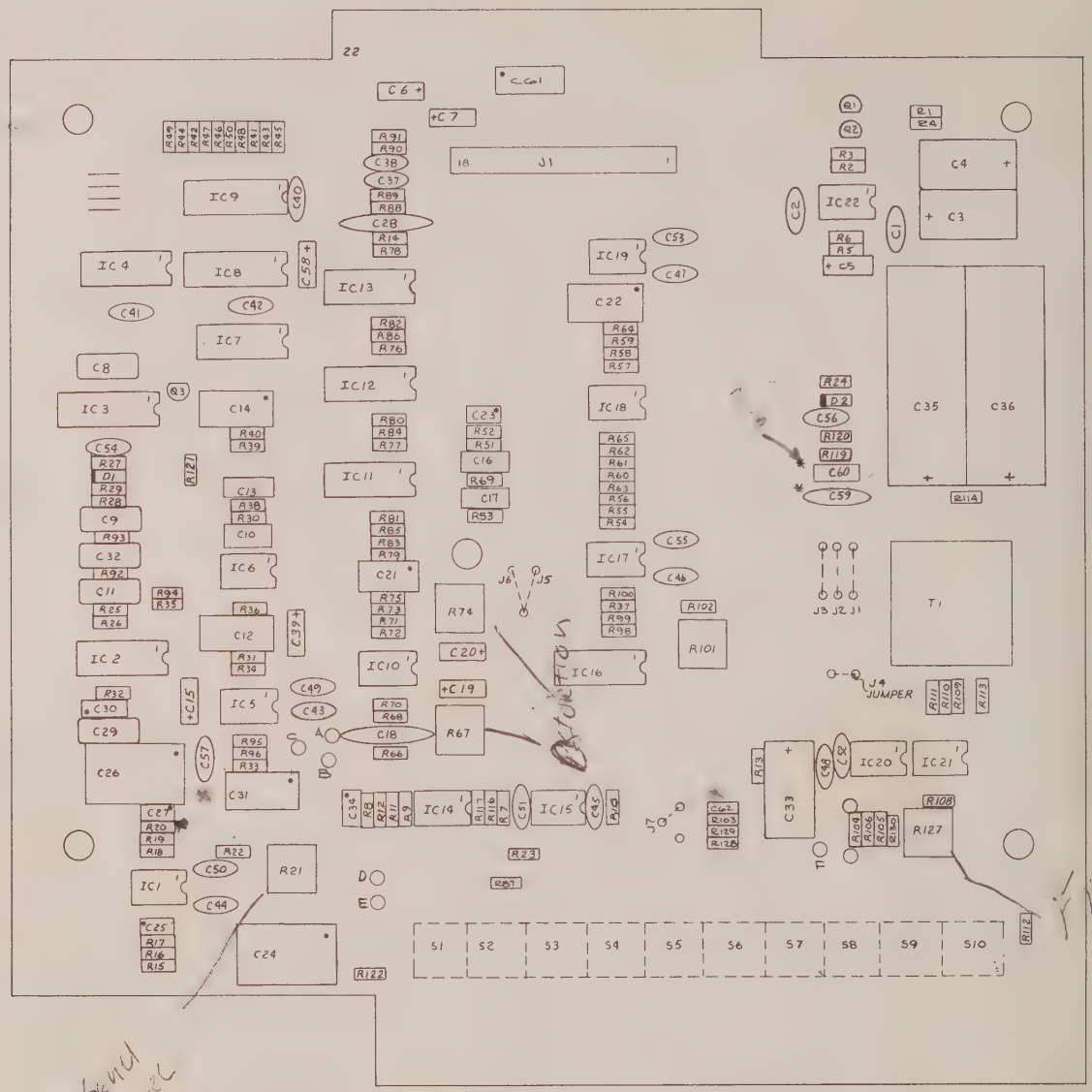


FIGURE 5-7. COUNTER SCHEMATIC



42-404

FIGURE 5-8. GENERATOR COMPONENT LAYOUT

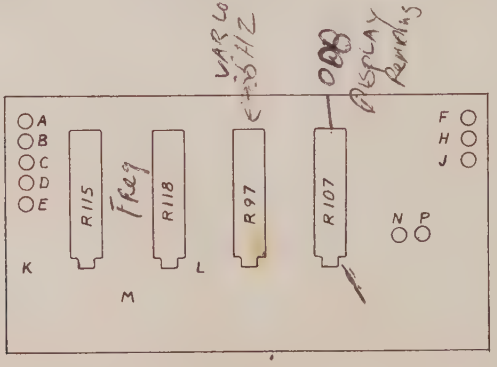


FIGURE 5-9. GENERATOR COMPONENT LAYOUT

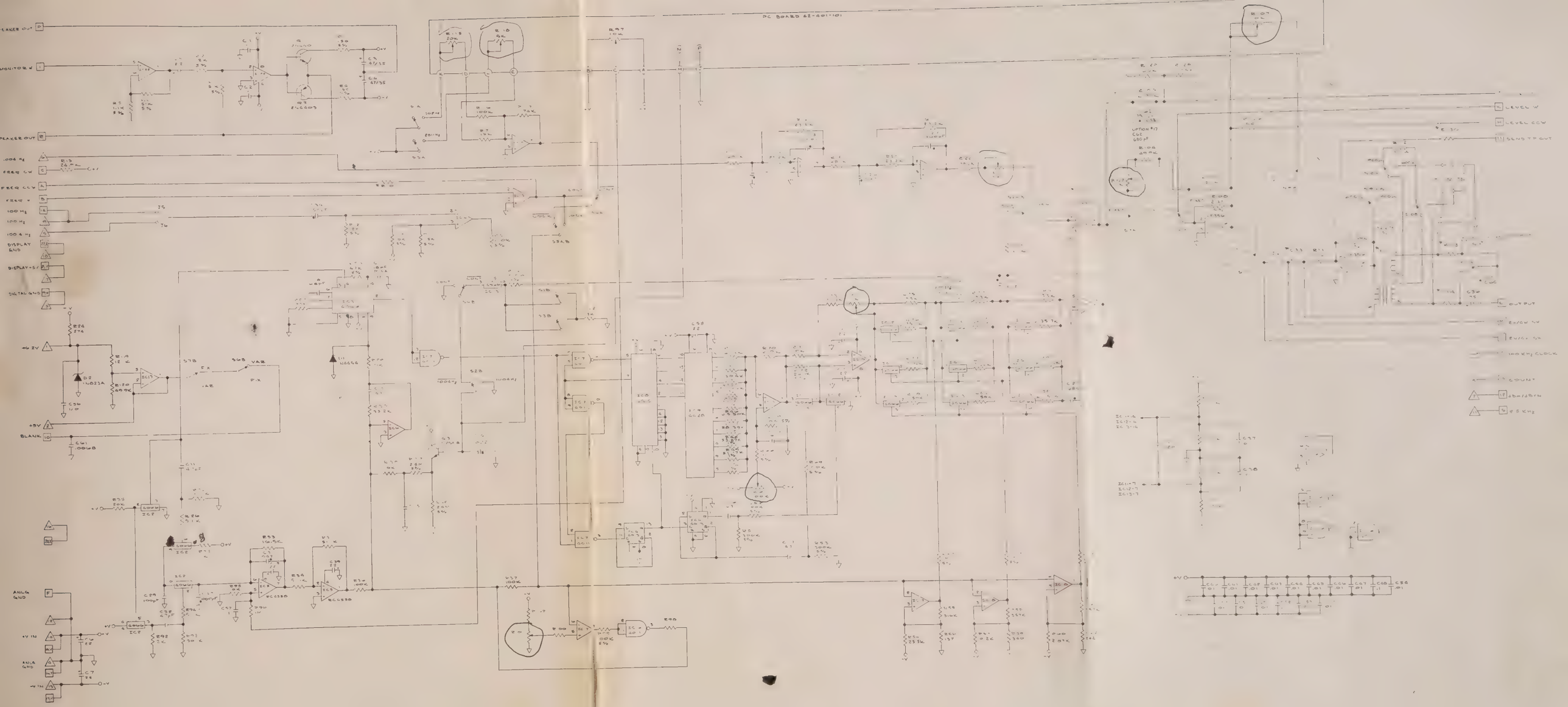


FIGURE 5-10. GENERATOR SCHEMATIC

42-400

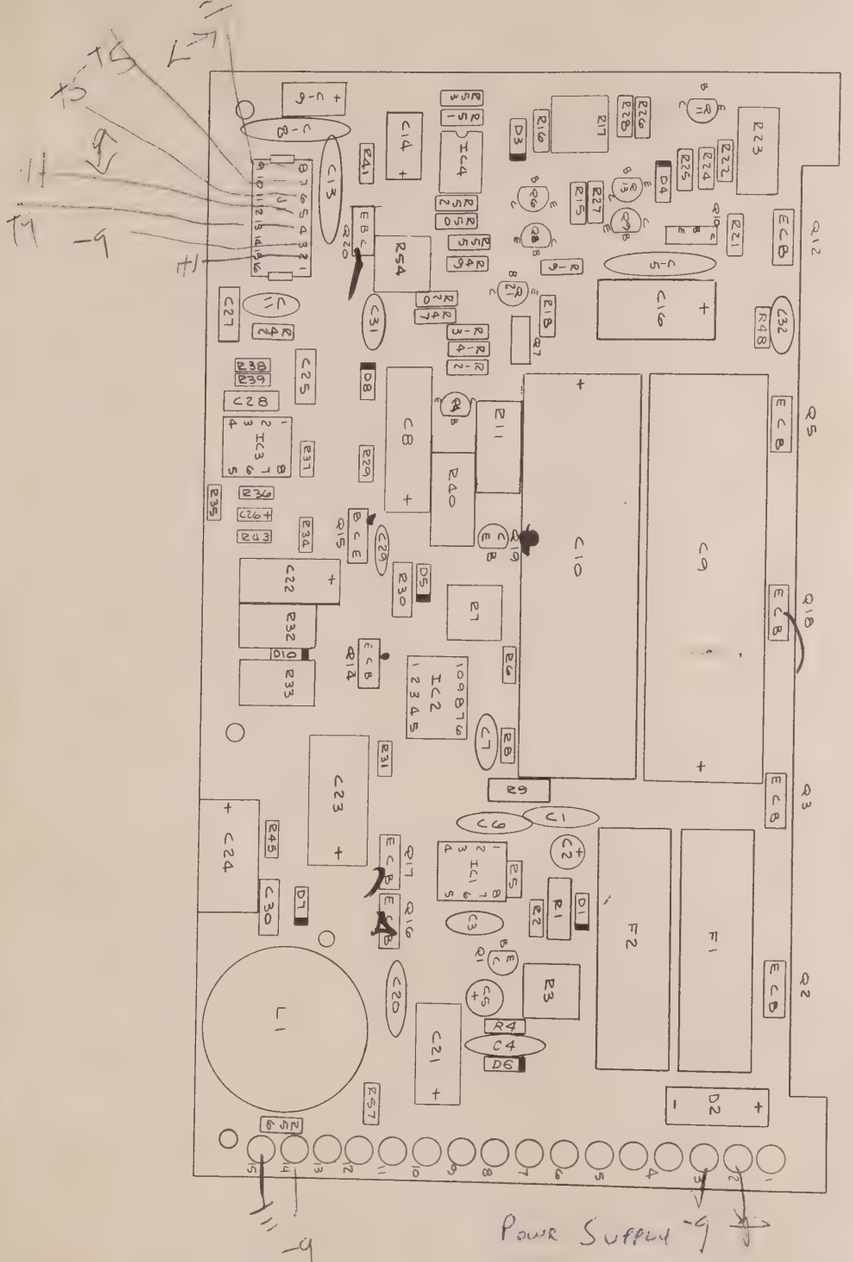


FIGURE 5-11. BATTERY POWER SUPPLY COMPONENT LAYOUT

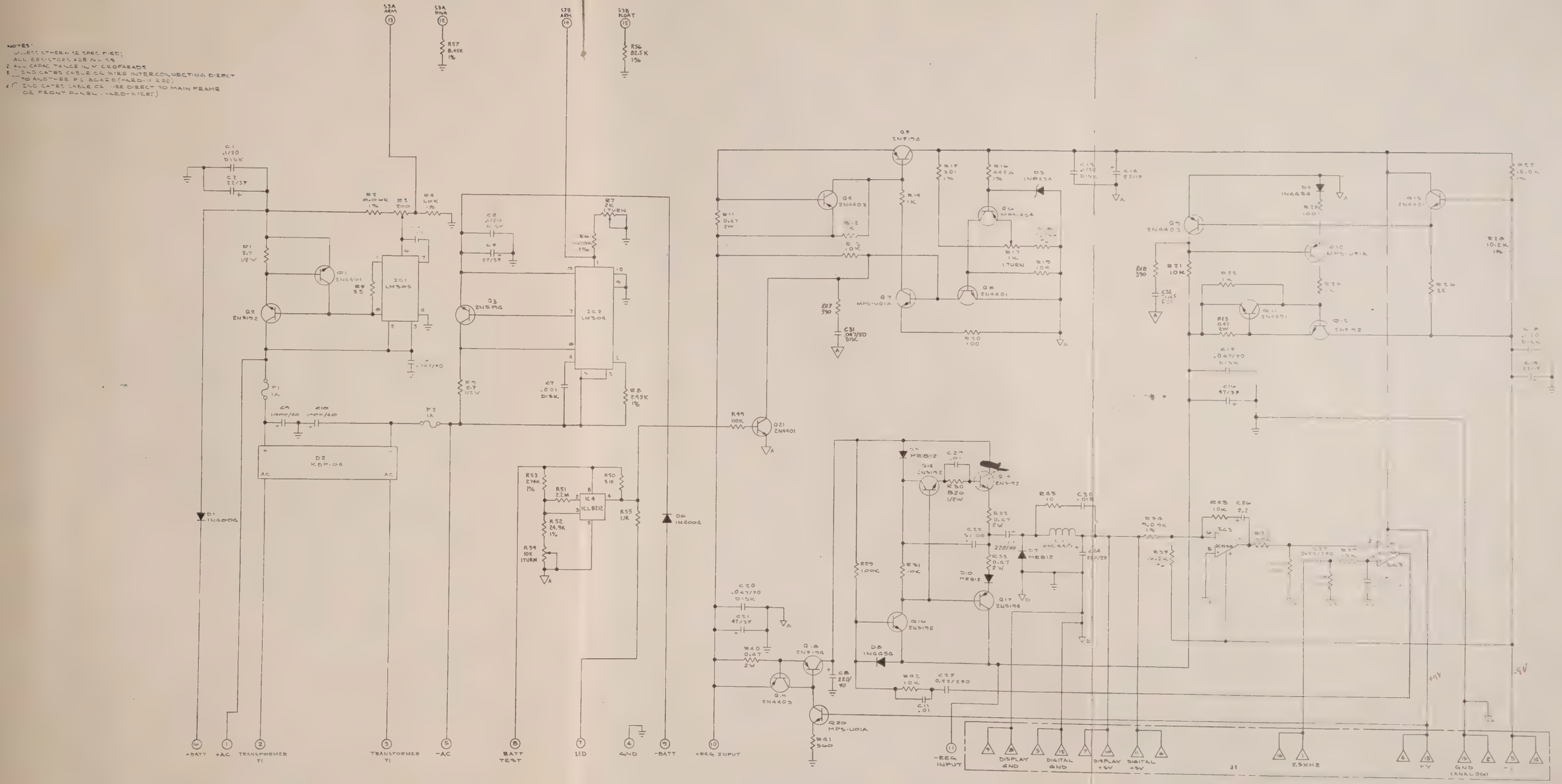


FIGURE 5-12. BATTERY POWER SUPPLY SCHEMATIC

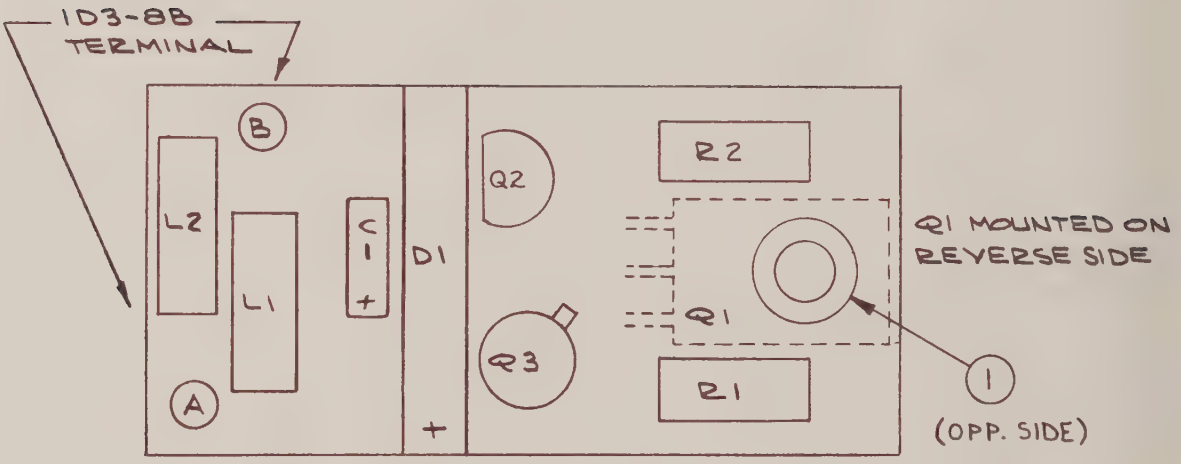


FIGURE 5-13. HOLD CIRCUIT COMPONENT LAYOUT

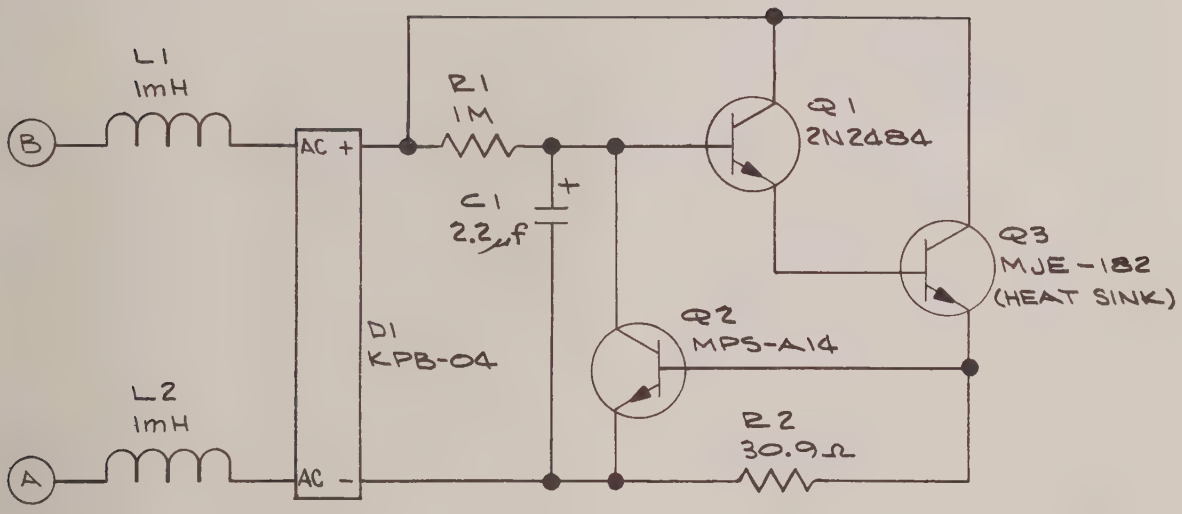


FIGURE 5-14. HOLD CIRCUIT SCHEMATIC

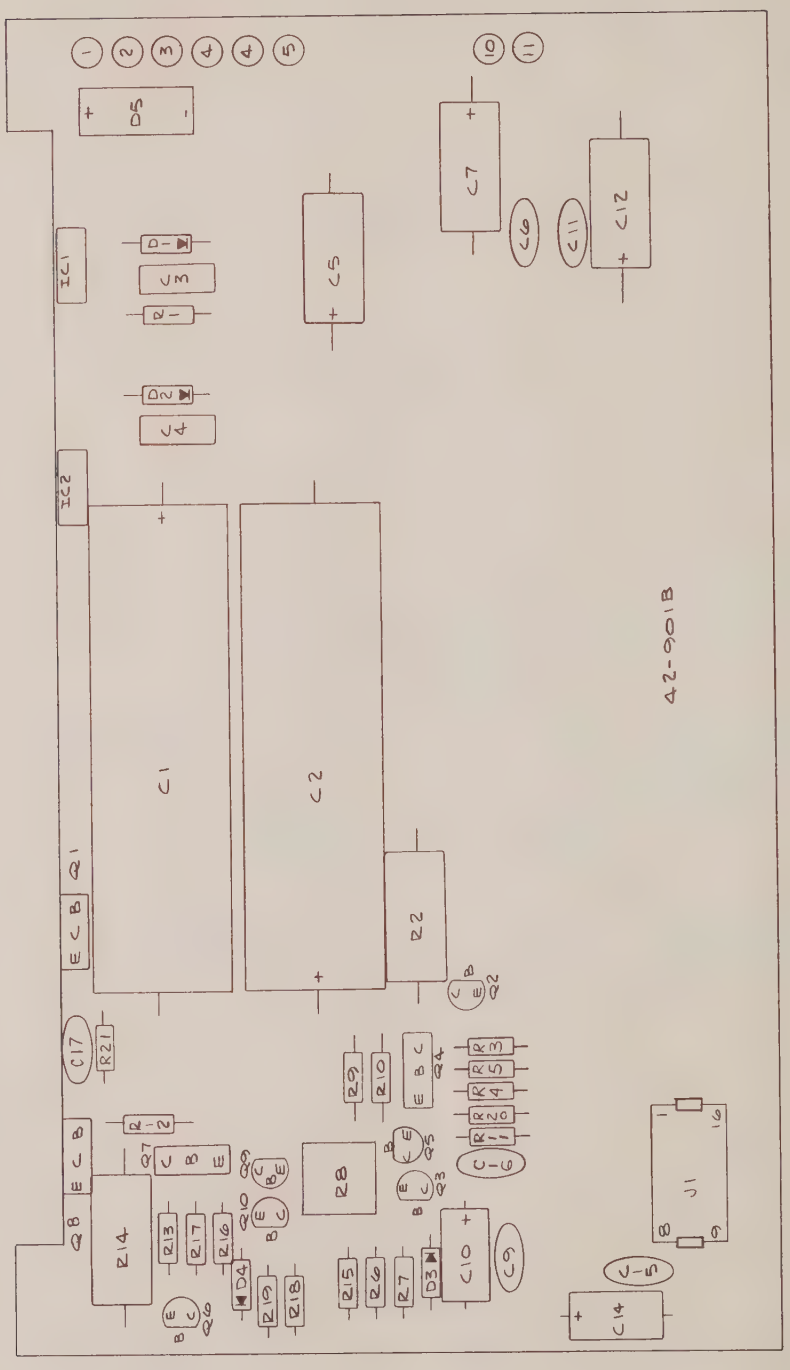


FIGURE 5-15. AC POWER SUPPLY COMPONENT LAYOUT

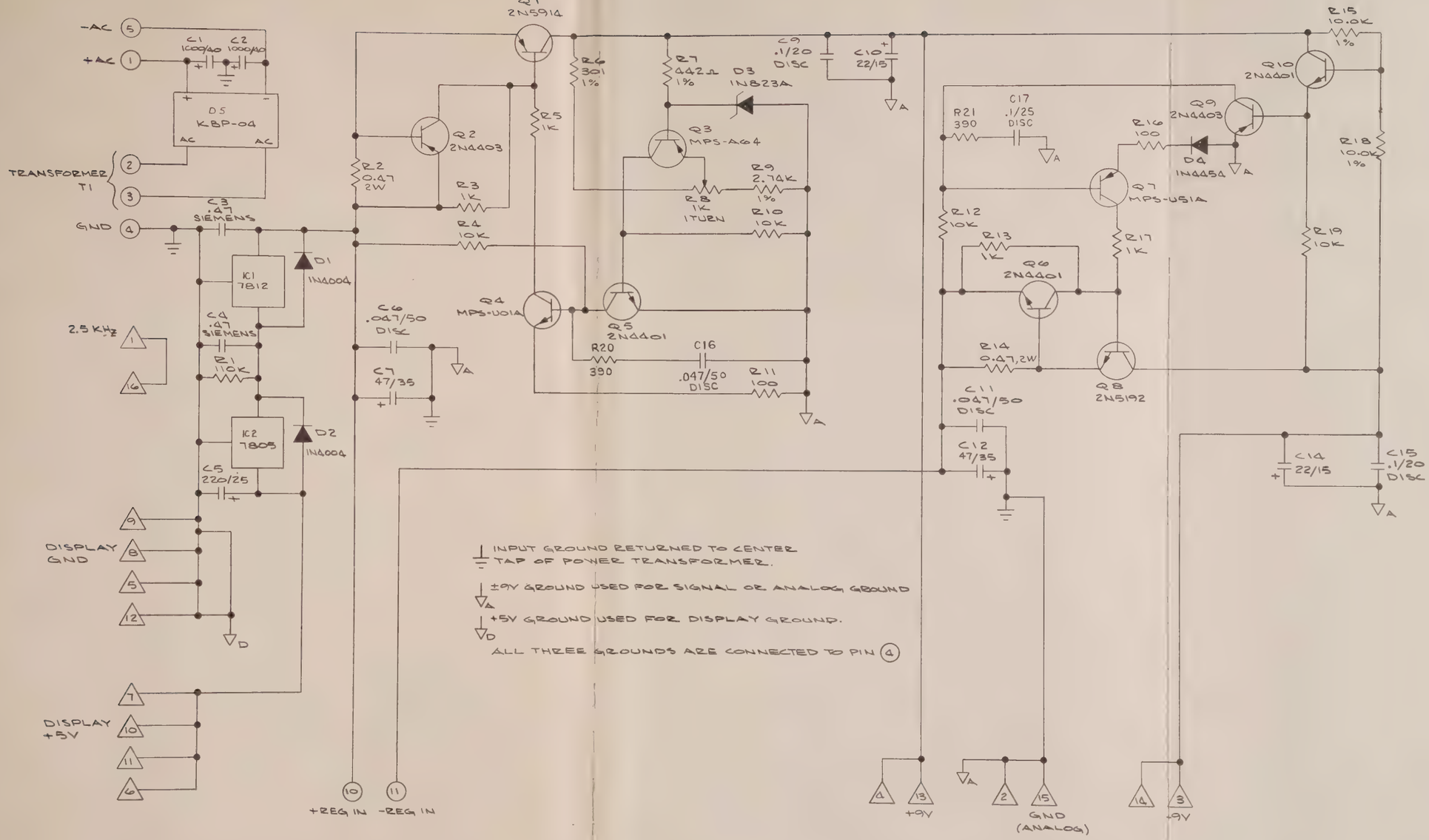
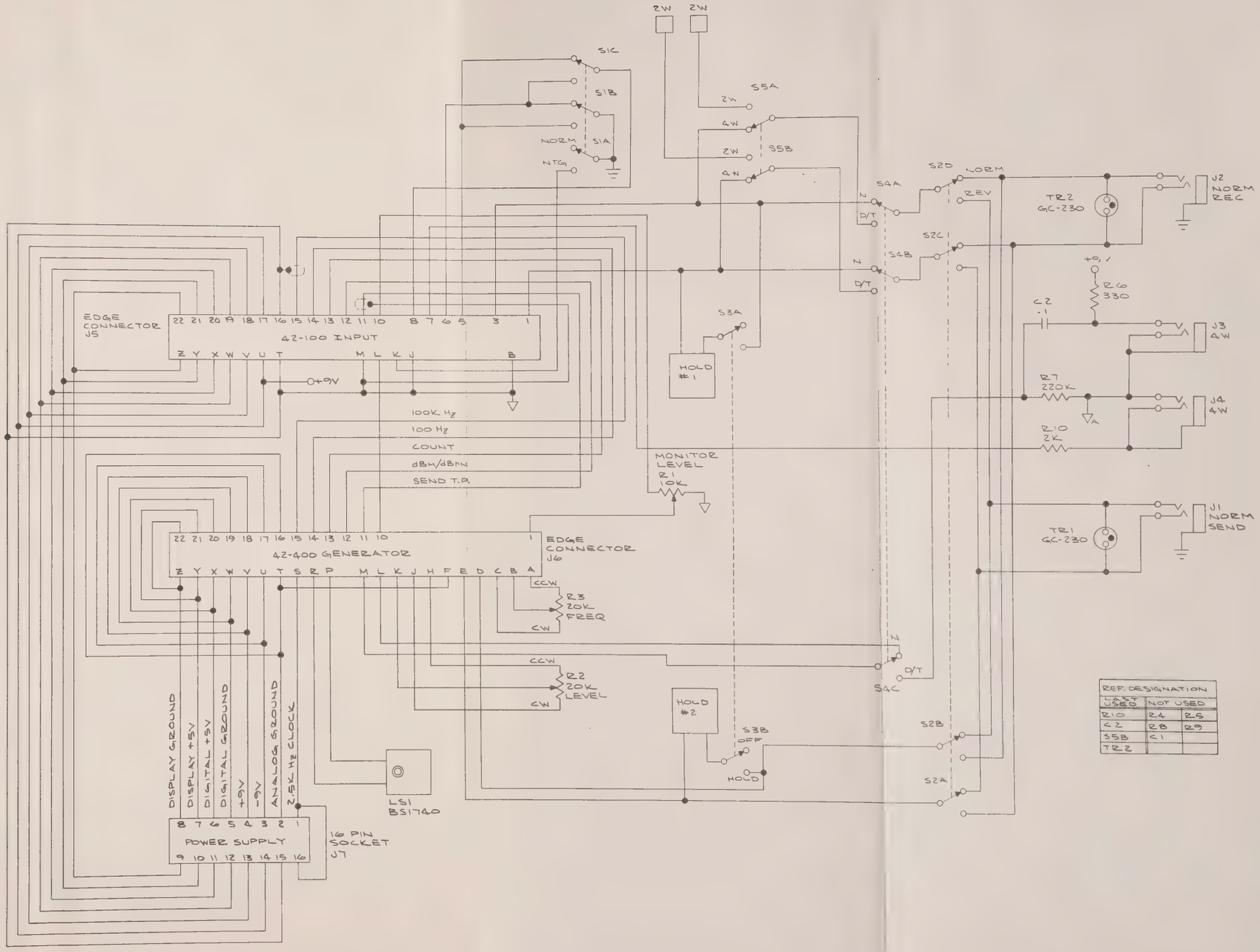


FIGURE 5-16. AC POWER SUPPLY SCHEMATIC



REF. DESIGNATION	
LAST USED	NOT USED
R10	R4 R5
C2	R8 R9
S5B	C1
TR2	

FIGURE 5-17. INTERCONNECT DIAGRAM

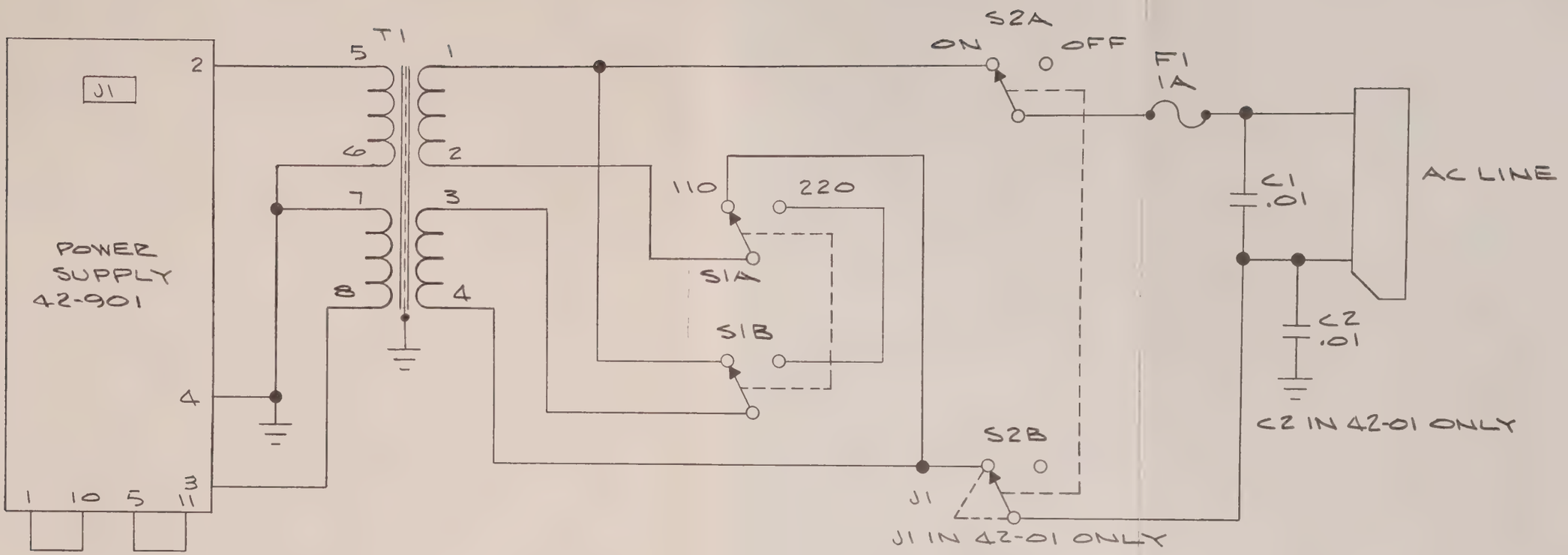


FIGURE 5-18. AC POWER SUPPLY SUBASSEMBLY DIAGRAM

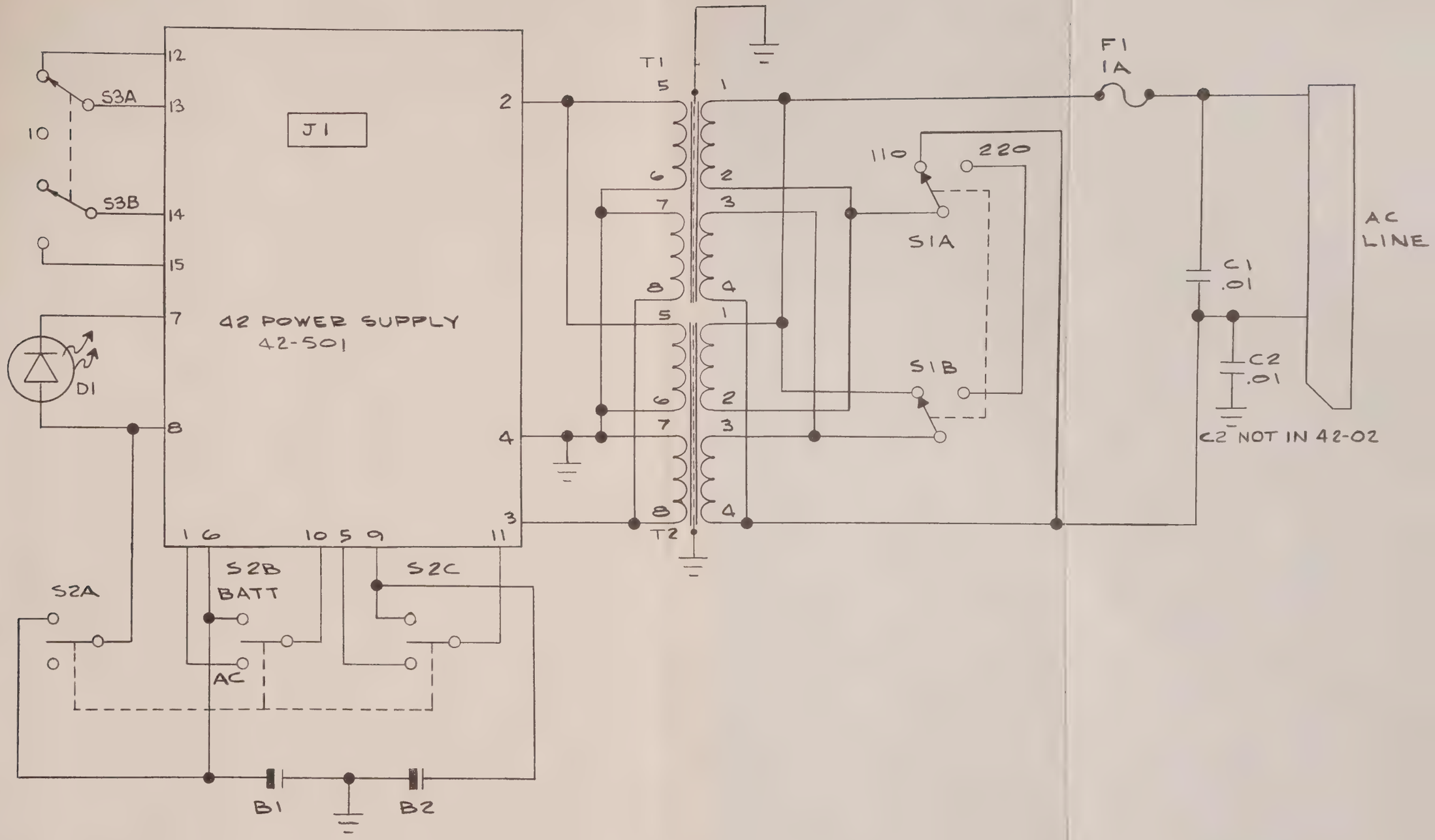


FIGURE 5-19 BATTERY POWER SUPPLY SUBASSEMBLY DIAGRAM

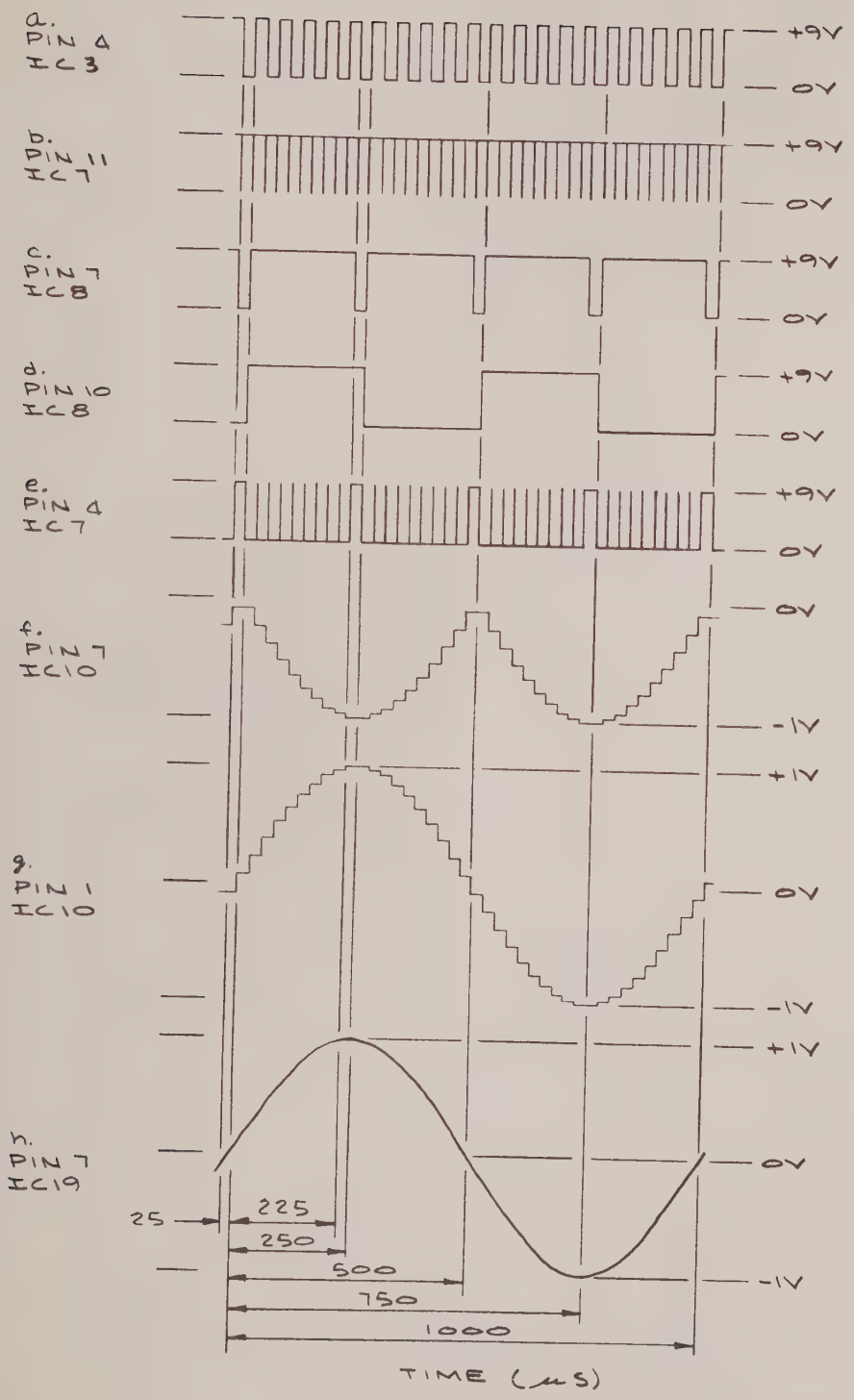


FIGURE 5-20. FREQUENCY GENERATOR TIMING DIAGRAM

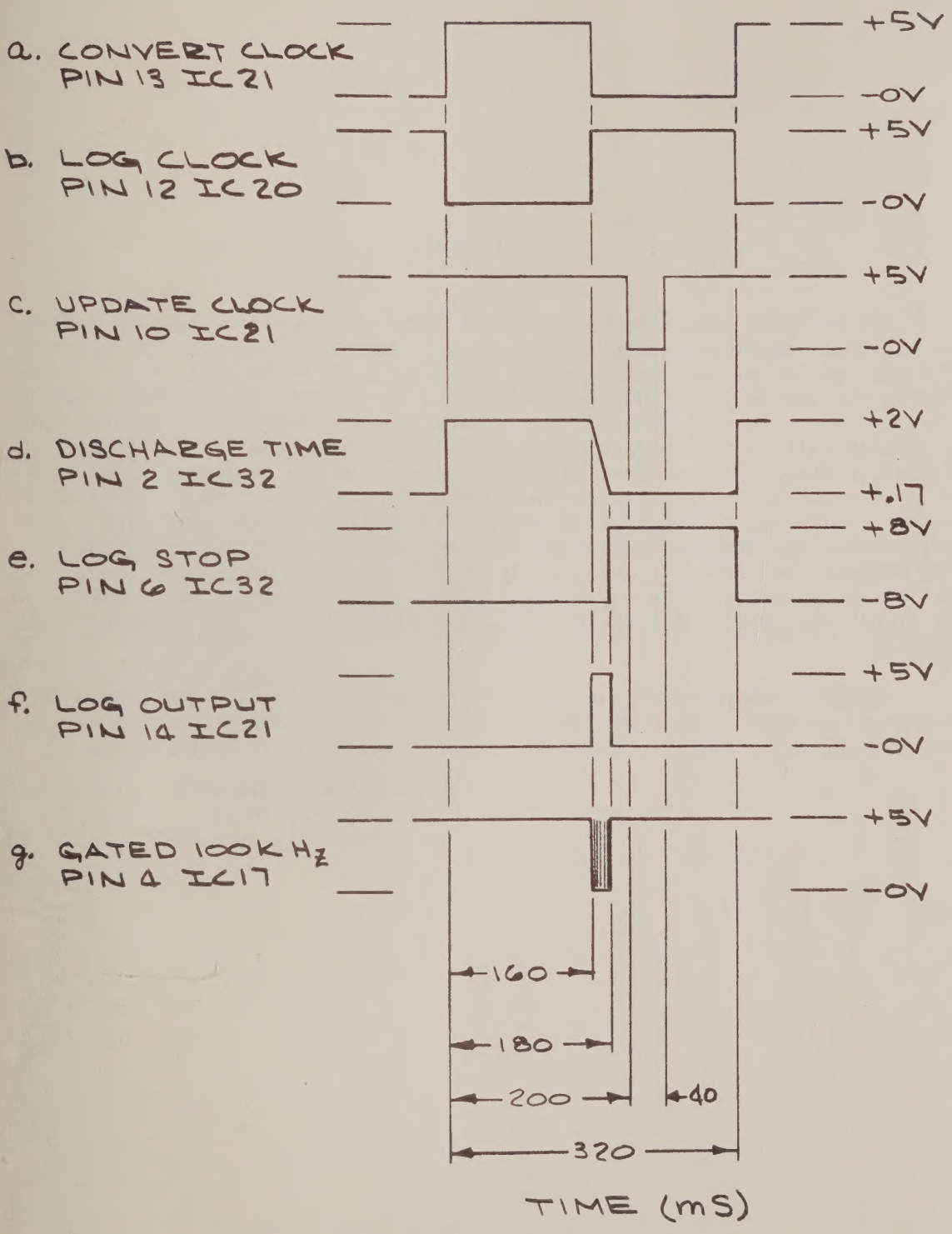


FIGURE 5-21. LOG CONVERTER TIMING DIAGRAM

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